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SELECTIONS FROM THE RECORDS

OF THE OFFICE OF THE

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SELECTIONS FROM THE RECORDS

OF THE

FINANCIAL COMMISSIONER'S OFFICE, No. 36.

No. LXIV.—MAIZE IN THE PUNJAB.

Note on Maize in the Punjab.

1. The Commissioner of Settlements and Agriculture (Lieutenant-Colonel Wace), in 1884, requested District Officers to furnish reports on the maize cultivation of their districts. The circular letter asking for these reports is given in Appendix A. Replies were received from most districts in 1884 and 1885, but press of work has prevented my taking up the subject before. No reports were received from the districts of Rohtak, Ferozepore, Mooltan, Lahore, Dera Ismail Khan, and Dera Gházi Khan; and from Bannu only the prescribed statement came without a descriptive report. A consolidated return, giving all the information contained in the district statements, will be found in Appendix C, and in Appendix B are given some leading statistics for the whole Province in a more convenient form.

2. The system of cultivation varies in different parts of the Province, and is well described in the following reports which are from the chief maize growing districts:—

From Settlement Officer	Karnál.
" Ditto	Umballa.
" District Judge	Kángra.
" Assistant Commissioner	Kulu.
" Settlement Officer	Hoshiárpur.
" Ditto	Jullundur.
" Deputy Commissioner	Ludhiána.
" Honorary Assistant Commissioner ...	Amritsar.
" Extra Assistant Commissioner ...	Gurdáspur.
" Assistant Settlement Officer ...	Ráwalpindi.
" Deputy Commissioner	Hazára.
" Assistant Commissioner	Peshávar.
" Deputy Commissioner	Kohát.

3. Little or no maize is grown in the western and south-western districts of Hissár, Rohtak, Gurgáon, Jhelum, Shahpur, Jhang, Montgomery, Mooltan, Muzaffargarh, Dera Gházi Khan and Dera Ismail Khan.

By a glance at the two last columns of Appendix B. it will be seen that maize in mostly grown where the summer rainfall is highest, that is, in the montane and sub-montane districts. The proportions of irrigated and unirrigated maize in the last two years have been—

	1884-85.	1885-86.
Irrigated	477,713 ...	464,468
Unirrigated	770,547 ...	717,684
Total ...	1,248,260 ...	1,182,152

and about five-sevenths of the unirrigated maize is grown in the hill districts of Hazára and Kángra, and the sub-montane districts of Hoshiárpur and Umballa, where the rainfall is good and practically certain. The crop will not thrive without abundant moisture, and where the rainfall is insufficient, there must be irrigation. But too heavy rain or long continued cloudy weather are nearly as bad as drought. Maize likes moderate and constant showers, with alternating sunshine. It also requires a rich soil, and is usually grown in the highly manured belts of land around villages or detached farms. It is scarcely ever grown on poor soil. If the land growing maize is not manured, it will usually be found that the soil is intrinsically rich, or has received a good alluvial deposit from a stream.

The Punjab cultivator generally recognises the importance of not growing maize plants very close together unless sown merely for fodder. It is nowhere the custom, as in America, to sow three or four seeds in separate little mounds of earth.

4. The common maize of the Province is yellow. The white kinds are little cultivated, though they are prized near towns for roasting in the cob. The plant has many uses. The cob is often roasted before quite ripe, or the ripe grains are parched, or the flour is made into porridge or bread. The grain is also sometimes given to horses and cattle; and the stalks and leaves are used as fodder. As the farmer cultivates maize in his best land, he does not care for any variety that occupies the ground for more than 80 or 90 days, for he looks to cut his maize crop in September or October, so as to be able to clear the ground for wheat or some other winter crop. It would be useless to attempt to introduce any variety of maize that occupies the ground too long, or that is not hardy and will not stand a slight drought, or that is too easily blown down by high winds. Some attempt has been made to introduce good kinds of American maize, but no variety has yet become popular.

No. 1330, dated 24th October 1884.

From—C. R. Hawkins, Esquire, Deputy Commissioner, Amritsar District,
To—The Commissioner of Settlements and Agriculture, Punjab.

In reply to your letter No. 561, dated 19th March, I have the honor to forward a report in vernacular (with English translation) prepared by Agha Kalbe Abid, Honorary Assistant Commissioner, giving a written account of the husbandry of the maize crop, as practised in the district of Amritsar.

Agha Kalbe Âbid Khan was specially placed in charge of this work.

2. Samples of each variety, with description, are also forwarded.

Translation of the Vernacular Report made by Agha Kalbe 'Abid, Honorary Assistant Commissioner.

The First Quality of Maize Produced in this District.

The grain of the above variety is yellow in colour. Its grain and cobs are larger than those of the other sorts. The cob generally grows to nine inches in length, and a grain when dry weighs not less than two "rattís." The produce of this sort of maize is generally more than that of the other sorts of this corn. It is sweet in taste, and the grain is more durable than that of the other varieties. It is sold at a higher rate, *viz.*, one or half a seer less per rupee than the other sorts, but it requires more labour in grinding than the other varieties. The stalk being rather coarse, is not much used as fodder for cattle, but sometimes the upper or softer parts of the stalks are cut up and used as fodder, otherwise they are used as sticks to light fires. In time of scarcity, the zamíndárs cut the main stalks of the crop into small pieces, and give them as food to their buffaloes. In the villages where the maize crop is generally sown, the zamíndárs chiefly live on this grain during the winter. They eat bread prepared of the maize-flour both in the morning and evening with "sarson," and eat the parched grain in the afternoon.

The amount of produce per acre is as follows:—

	Maunds.		*Maunds.*
First sort from	19	to	24
Second or average	14	to	17

A strong full-grown man cannot eat more than one seer, and an ordinary man 12 chittanks, and a weak man or a woman eight chittanks only.

Second Quality of Maize Crop.

This sort of the maize crop is largely sown in this district. Its cob does not exceed 6 inches in length, and the grain, when dry, does not weigh more than 1½ rattí. Its produce is less than that of the first quality. It is also sweet in taste, hard in grinding and durable like the first sort, but is a little cheaper. The stalks ("tándás") of the crop are thin and, therefore, they are generally used as fodder for the cattle. The remainder of the "tándás" are used as fuel.

Its produce per acre is as follows :—

	Maunds.	
First sort	19	per acre.
Second do.	13	,,
Inferior	10	,,

THIRD QUALITY OF MAIZE CROP, WHITE.

This sort of maize commonly grows in the villages on the banks of the River Ravi. The length of the cob is 6 inches, and grain, when dry, weighs 1½ rattis only. The yield is less than that of the yellow variety. The yield per acre is estimated as follows :—

	Maunds.	
Superior kinds	17	per acre.
Average	13	,,
Inferior	10	,,

It is not so well tasted as the yellow grain, it keeps as long as the other varieties. It is sold a little cheaper than the above varieties, say a seer or half a seer per rupee. Its stalks are used as described above.

THE FOURTH QUALITY OF MAIZE, CALLED LAHORI.

The cob of this sort of the maize grows to a length of four inches only, and a grain of it, when dry, weighs one ratti only. Its taste is good. The yield per acre is as follows :—

	Maunds.	Seers.	
Superior	3	25	per acre.
Average	3	7	,,
Inferior	2	16	,,

The stalks are soft and are used for cattle food. It is sold a little cheaper than the yellow kinds of maize. The yield is small, but it is useful in one respect, *viz.*, if the time for sowing yellow and white maize be past, the Lahori maize, even if sown in the beginning of Bhádon, grows up to the end of Assu, and ripens in two or two and a half months.

II. System of husbandry of the land on which sown, describing the whole year's course, so as to show what crops precede and follow.

The "Gora," "Maira" and "Rohi," are the lands best suited for the cultivation of the above kinds of maize, except the white or third sort. Goradeh land is that which is habitually manured, and is situated near a village site. The land in which maize is intended to be sown should be manured to the same extent as for producing vegetables, *viz.*, one cart-load of manure to four marlás of land. One cart-load for five marlás is an average rate, and one cart-load of manure for six marlás is the lowest. The land proposed for this cultivation should be "Warhal," or already ploughed, in which no crop has been sown during last preceding season. After cutting the maize crop, sainji, a fodder crop, lucerne, and methra (a vegetable) are sown, but sometimes til and másh grains are also sown with the maize crop, but the former ripens in a fortnight after the latter crop is cut. The proprietors who have not sufficient lands, sometimes sow wheat in the fields just cleared of a maize crop.

The white or third quality of maize is generally sown in Bati and moist flooded lands, or Sailába lands.

The Lahori maize crop (or fourth sort) is often sown after sugar-cane and wheat, and after reaping the maize crop, "til" and "methra" are sown, but generally the maize is sown alone.

III. Ploughing, irrigation and manuring anterior to sowing.

The land, after lying fallow for one season, should be ploughed nine or ten times. Before sowing, it is once irrigated and levelled to keep in the moisture. It is also manured as detailed in answer to question (2). After sowing, a top dressing of manure improves the crop.

IV. Date of sowing, treatment of the field between sowing and harvesting.

Maize should be sown between the 1st and 15th of Sáwan. The seeds should be sown some way apart. For instance, a quarter of a seer of the seed should be scattered over one "kanál" of the land. When the crop grows to a span height, the ground round the plants should be dug or turned up once. This will be done, *viz.*, when the crop grows to the height of a man's ankle, to his knee and lastly when the joints of the plants begin to burst out to produce cobs. The crop should be irrigated two days after the ground round the plants has been turned up. It should be watered three times between the time of budding and ripening. The crop should be irrigated seven or eight times, but this depends on the excess or scarcity of rain. Care must be taken when the maize crop approaches ripening to avert damage from rats to young crops, but when it ripens, the parrots, crows, jackals, pigs and cats all come to eat and destroy it.

After the maize crop is ripe, the zamíndárs cut and stack it, and let it stand in the fields from one to two weeks. They then separate the cobs from the stalks and bleach them; if the quantity of grain is great, they have it thrashed by cattle; if small, they thrash it with sticks to extract the grain. In the case of Lahori maize there is no need for stacking it. The zamíndars begin to take off the ripe cobs early in Assu, and cut the crop altogether at the end of Kátik. This kind of maize requires hoeing twice or thrice round the plants, and irrigation four times during the whole course. It is particularly sown in "Gora" cháhi, maira and sailába lands.

V. Date of ripening of the cobs and subsequent treatment thereof up to the separation of the grain from the cob.

The answer to this question has been fully given in the preceding answer to 2—4.

VI. Estimated yield per acre.

The yield of first quality of maize is per acre:

	Pacca Mds.	Mds.
1st class from	19	to 24
2nd or average	14	to 17
3rd or inferior less than above.		

The yield of second quality maize per acre—

	Mds.
1st classs or superior	19
2nd or average	13
3rd or inferior	10

The yield of third quality of maize or white is—

1st class or superior	17 per acre.
2nd or average	13 ,,
3rd or inferior	10 ,,

The yield of Lahori maize crop or fourth quality—

	Mds.	Seers.	
1st class or superior	3	25	per acre.
2nd or average	3	7	,,
3rd or inferior	2	16	,,

VII. Consumption of the grain and stalks.

In the villages where maize is largely cultivated, the zamíndárs largely use this grain in chupátties, both in the morning and evening and eat it with "sarson," a vegetable herb, and in the afternoon they eat the grain parched. A strong and full grown man can eat one seer per diem, an ordinary man 12 chittánks, and a weak man and woman 8 chittánks daily. A milch buffalo eats from 2 to 4 seers per day. The horses are also given the cobs sometimes instead of green wheat. Maize is not so largely grown as wheat, and, therefore, it is not exported, but it is consumed in the district. If the grain be exported for trade, there is no demand, and it does not bring any profit. The grain can only be kept from one season to another. Afterwards gets bitter, rancid and cannot keep for a long time. It is also eaten up by insects. The zamíndárs prefer selling wheat rather than maize, if they are in need.

The stalks are generally given to cattle, particularly when there is scarcity of fodder, and the remainder is consumed as fuel.

VIII. Blights and other diseases to the crop.

The diseases to which the maize crop is liable, are "tela" a small sized worm or insect, "sundhi" a large worm (insect) which eats up the crop. Excessive rain also injures the crop but kills the worms.

The third quality, or white maize, which is sown in "Bati" or low lands, is also liable to two blights.

First, if the ground round the plants is not dug or hoed in "Bhádon," or neglected, the vapours or heat come out from the ground and burn the crop; secondly, if the land on which the maize crop stands gets flooded in Assu, the heat destroys the crop, and if no care is taken when the cobs begin to ripen, the parrots, crows, squirrels, jackals, pigs and cats all come round to destroy the crop.

IX. General remarks and suggestions.

In this district the maize crops are very eagerly sown. It is a long standing custom that in two ghamáos of land on each well, or one-fourth of the land at least, maize is sown. The cultivation of this crop has apparently two advantages, one that the land is cleared in three months. The other that "saínji," "methra" and wheat can be cultivated in the lands after the maize crop. Besides this, the yield is more than that of wheat, and the zamíndárs chiefly live on it to save their wheat which they sell to meet their other expenses, paying Government revenue and debts due to the village bankers. If they have got no maize grain, they are obliged to eat wheat and rice, and thus they are put to great loss. The zamíndárs have a great advantage in sowing maize crops in their lands, for the land which has been once prepared and manured for maize cultivation does not lose its productive power for a year. They at first sow sainji, methra, and wheat and barley immediately after the maize is cut, and still the land remains available for wheat cultivation in the next year. The labour and careful attention bestowed on the improvement of this crop are of benefit. But it is worthy of notice, that on such lands the water rate, at a full rate, is realized twice a year, and its account per acre comes to—

	Rs.	As.
Water rate on maize crop...	1	8
Sainji sown in land vacated by maize crop	1	8
Water-advantage rate and cesses on maize crop ...	1	4
Water-advantage revenue charged on the land in which barley, wheat and sainji is sown with cesses	0	10
Government land revenue with cesses ...	1	8
Total revenue per acre ...	6	6

But if barley and wheat are cultivated in the land after the maize crop, Rs. 2-8-0 per acre is charged on account of water rate on the above cultivation. The total charge per acre, on land in which wheat and barley is grown after the maize crop, comes to Rs 7-8-0.

As this kind of crop is more profitable, the zamíndárs should be made some allowance, so that they may be encouraged to improve the cultivation, for the zamíndárs in cultivating the maize crop have to give more labor in ploughing and manuring the land and turning up in digging grounds round the plants successively, and taking much more care in irrigating and watching this crop than for other crops. Whereas the high rates of water rent and water-advantage revenue deter the zamíndárs from sowing the maize crop on extensive areas, a remission of one-third or one-fourth of the water rates levied at present should be granted if advisable.

If the seeds of the best maize crop grown in another country be found more profitable and rich, they should be distributed to the cultivators of this country. If the climate and soil of this country suit the imported seed, it would do much good to the people of this district.

No. 1986, dated 27th October 1884.

From—R. Clarke, Esquire, Deputy Commissioner, Hazára,

To—The Commissioner of Settlements and Agriculture, Punjab.

In compliance with his Circular No. 561 of 19th March 1884, submits a most interesting report on maize cultivation in the district, for the preparation of which he is indebted to Mr. Kennedy, Assistant Commissioner.

Report on the cultivation of maize in Hazára District, by Mr. T. G. Kennedy, Assistant Commissioner.

Varieties grown, and the circumstances under which each is grown.

THERE are four varieties of maize grown in this district, two which are practically indigenous, and two lately imported. The two indigenous varieties are distinguished by their colors, the one having cobs of black and white grains intermingled; the other with white or yellowish white grains. The cobs of the indigenous varieties are much smaller than those of the recently imported, and the grain is also smaller. The recently imported varieties are distinguished by their colors, the one being white, with bean shaped grains, the other light yellow with rounder grains. The zamíndárs say they prefer the native variety with yellowish grains. It is sweeter than the other varieties when made into bread. The other indigenous variety, when made into bread, gives a dark color to the cakes, and is not liked. The recently imported varieties occupy a middle place in popular estimation. Maize forms the staple food of the people of this district. It is almost wholly made into the cakes of the country; little is eaten as a vegetable or parched; hence there is not the distinction between the varieties grown for consumption as a vegetable, for roasting and for bread which exists in America. The varieties chiefly grown in this neighbourhood are the large white imported variety and the yellow indigenous variety. The cultivation of the former is gaining ground on account of the excellent outturn it gives, though the latter is preferred as a food. The speckled indigenous variety, and the smaller yellow imported variety are rather agricultural curiosities than staple products. The common imported variety (which I believe to be the Cuzco maize) requires a good soil, hence it is not likely to displace the indigenous variety, so as to become the staple crop; moreover the outturn of flour from the former is not in proportion to the size of its grains, as the husk is disproportionately larger. A glance at the grains of the two varieties will illustrate this. In the one the grains are round, plump and full of flour, in the other notched and narrow.

System of husbandry of the land on which sown.

All the varieties are "Sáwani" crops. There is no exclusively "Hári" grown maize, as in the Ráwalpindi district, but it sometimes happens, especially in the villages of this tahsíl, that maize is grown as a winter crop in gardens in favoured situations, where a mild climate prevails. Over the greater part of the district the winter cold is too intense to admit of a "Hári" crop. The "Sáwani" crop is sown in "Jeth," both on the manured land near the village site, and the unmanured land at a distance from it. The zamíndárs say that of late years they have had to restrict their manured land owing to the strict forest laws, which prevent them using wood (and not dung) as a fuel as heretofore, but this is probably only the usual gibe at the unpopular Forest Regulation. About two seers of seed are sown to a kanál. The seed is sown broad-cast and not in furrows with the dibbler; nor, as far as I can discover, are cucumbers or the lesser millets grown between the rows as is customary down country. The field is manured before ploughing begins at the end of "Phágan," and ploughing goes on during "Phágan" and "Visákh." Two or three ploughings are given to a field in what is called in the Ráwalpindi district the "gute bhan" method. Two kanáls a day constitute an average day's ploughing, or one kanál less than in the Ráwalpindi district. There is little or no well irrigation in this district. In a year of drought, the flow from springs is utilized for irrigation purposes, but as a general rule the rain-fall is amply sufficient for maize cultivation, for it is not a "thirsty" crop. In order to conserve the rainfall the people go to some trouble in terracing their fields. On a hill side these terraces are made of boulders, and must have cost the zamíndárs infinite labor in their erection. After the crop is sown, it is not regularly weeded; but to eradicate weeds and to thin the crop which is sown very thickly at first, and also to loosen the soil around the roots and prevent it panning, the process of "sil karna," similar to that adopted in the case of "bájra" fields in the Ráwalpindi district, is put into operation. This is done in "Hár," and then the crop is left to ripen. The maize ripens in "Asoj," but cobs are plucked before this for eating in "Bhádon." When it is ripe the stalks are cut down with the cobs in their sheaths with them. They are made into bundles and left ten or twenty days in the field to dry. When thoroughly dry, the cobs are taken out of their sheaths by women and thrown into a heap, and the grains are separated from the fibre on which they cluster by treading with cattle. The husked cob ("tuka") is used for burning.

The grain is separated from the fibre by means of wooden spades called "pher." The mixed fibre and grain are thrown up in the air, and the latter being the heavier, falls separately from the former. The grain is stored in mud receptacles inside the house. The stalks are thrown to cattle who feed upon the leaves and upper part of the stalk and leave the hard lower portions which are usually burnt, and very occasionally made into a thatch for doors or windows. The large Cuzco variety gives on an average two maunds to a kanál, the indigenous variety from 30 seers to 1½ maunds, according to the season, quality of the ground and manure used. It will be seen that the figures of the produce correspond fairly accurately with those from the North-West Provinces, where the produce is estimated at 10 maunds in unirrigated, to 14 maunds in irrigated land per acre. Much more seed is used in this district than in the North-West Provinces, where only 6 seers are given to the acre, but the discrepancy is probably due to the fact that in the North-West Provinces other crops are grown between the furrows. A dry hot summer is the one best suited for maize. The most fatal disease to maize is "jhal" or "channi," which causes the stalk to dry up. Excessive moisture brings this on. Maize is also subject to the attacks of grubs, especially in dry weather, and hailstones frequently cause much mischief. Maize is the chief staple of the district. It is sown year after year on the same land. Occasionally it is replaced by rice on marshy ground, and occasionally it is followed by wheat on lands in the neighbourhood of the village site, but this wheat is sown not so much for its seed as to be cut green for stock feeding; especially in the neighbourhood of cantonments or towns. In this district it is sown on every variety of soil, from the poor soil which covers with a thin layer a mountain's side, to the rich alluvial land in the valleys beneath. The large imported variety sells about two seers in the rupee cheaper than the indigenous variety.

General remarks.

For the sake of seed the best ears are occasionally selected. I have made enquiries, and find that the custom which prevails in the Jullundur district, of cutting off the tops of the cobs, and reserving the lower part for seed, does not prevail, nor do they, as in America cut off the tops and, bottoms of the cobs. No custom prevails of bringing seed from a distance; home grown seed, is sown. Specimens of the cobs of the four varieties of maize sown in the district are herewith submitted.

No. 887, dated 24th November 1884.

From—Colonel A. Harcourt, Deputy Commissioner, Gurdáspur District,

To—The Secretary to Financial Commissioner, Punjab.

I have the honor to send you the report on maize called for in Colonel Wace's No. 561 of 19th March 1884.

2. This report has been prepared by Rai Múl Ráj, Extra Assistant Commissioner. Here and there I have made a few small corrections in the English, but these are very few and slight, and the entire credit of this full and interesting report belongs to Rai Múl Ráj. The Extra Assistant Commissioner explains to me that he regrets he has not been able to make such complete notes as was, in his opinion, desirable, as his duties as Treasury Officer confined him so much to the Sadr, where he had very heavy work. This I can vouch for. Rai Múl Ráj also was quite prostrated with fever just at the very time when, to write a clear report, health was a desideratum. But I think he has done very well, and I trust you will agree with me in this.

Notes on the cultivation of maize in Gurdáspur district, by Múl Ráj, Extra Assistant Commissioner.

The people of this district recognize three varieties of maize by the difference of the color of the grain, namely the yellow, the white and the red. The yellow and the white variety only are cultivated in this district, and in separate fields. The red is not cultivated in this district at all. Occasionally here and there in a field some plant is found growing having red grain. In the Gurdáspur and Batála tahsíls the yellow is preferred to the white, as the yellow variety has larger cobs, bigger grain and is sweeter in taste than the white. In the hilly tahsíl of Pathánkot, however, the white is preferred to the yellow, as the white variety in that tahsíl is of sweeter taste, and is considered as less heating than the yellow. In the Shakargarh tahsíl, on the other hand, in some parts the white is preferred, while in others the yellow. Maize is not consumed

as a vegetable at all in this district. Bread is made of both the yellow and the white varieties. Cobs of both varieties are roasted, while the maize is yet unripe, and the grains are eaten in a parched state with relish by people of all the working classes who possess strong digestion. The yellow variety flourishes best on richly manured lands, and it requires greater attention than does the white. It comes to maturity after longer delay than the white. The white in preference to the yellow is generally sown in Gurdáspur and Batála tahsíls when the rainy season sets in later on in the year, and when the time for sowing of the yellow variety has passed, but though sown after the yellow it ripens at the same time as the yellow. If the white is sown at the same time as the yellow, then it comes to maturity about 20 days earlier than the yellow. The white variety again requires less of rain and irrigation than the yellow. In the Pathánkot, Shakargarh and Gurdáspur tahsíls the white is cultivated to greater extent than is the yellow, whereas in the Batála tahsíl the yellow is cultivated to greater extent than is the white. It is said that in the Batála tahsíl, in several villages, if the white seed is sown for four years consecutively it becomes yellow.

2 Maize flourishes best in *Gora* lands which lie round a village and which, therefore, are richly manured, as people ease themselves in the surrounding fields. It is also cultivated in Rohi, Maira, Dosháhi and Sáilába lands. But in high lands (Tibba) it is not cultivated, as the crop dries for want of sufficient moisture, neither is it in low lying lands where water collects, as in such places the crop is destroyed by the water. After cutting wheat, gram, mustard (sarsaf) barley and sugar-cane, the land is watered, if it does not rain, ploughed, manured and thus prepared for maize, which is sown at the end of the month of Hár and in the beginning of Sáwan. The crop comes to maturity at the end of Bhádon in three months after sowing. It is cut down in the month of Assú. Then immediately afterwards, massar, barley or senji is sown in the land. If these are not sown, then the land is prepared for sugar-cane and cotton which are sown in the months of Phágan and Chét. If cotton and sugar-cane are not sown, then the soil is allowed to lie fallow for a year, after which time wheat is sown in the land. Maize thrives best and yields excellent produce in land in which senji has been grown. Senji is grown for fodder for cattle, and remains on the land from the month of Kátik to Phágan or Chét. Land is said to be never exhausted if maize and senji follow each other in the rotation of crops. Sometimes wheat is sown immediately after cutting maize, but then the wheat is of very inferior quality, and the yield per acre is very small. It is best to cultivate maize alone without mixing it with other crops. The poor cultivators, however, not unfrequently mix másh pulse, and sometimes kangni and mandal also.

3. After the rabi crop has been cut, the land is watered once if it does not rain. Then after the land has partially dried (*vattar*), it is ploughed, generally from five to ten times in the dry state, an interval of at least three days being allowed between each ploughing. About a week before it is intended to sow the land, manure is scattered on it. Generally 40 or 50 maunds of manure in an acre are used. Fifty maunds in a kanál is regarded as very good manuring, though it is the opinion of zamíndars that no amount of manure is more than sufficient or injurious for the maize crop. The manure of sheep (known by the term rik) is considered the best. Ordinarily the common manure of cow dung and rubbish, known by the name of ruri, which is collected in heaps round the immediate vicinity of villages, is used for manuring fields for all purposes. After manuring the field it is watered a day or two afterwards if it does not rain. After three or four days of sunshine, when the land is *vattar*, it is ploughed once or twice and seed is sown. In some places the land is manured after it has rained or the land has been watered and seed is sown after ploughing the land once, while in other places the seed is sown after manuring, but without ploughing the land. The object of watering the land once after cutting the rabi crops, or waiting for the land to be watered by rain before ploughing, is stated by the zamíndars to be that the land cannot be ploughed when it is very hard. After the first ploughing it is considered best to plough the land when dry during the hot months of Jéth and Hár, so as to reduce the earth into the state of pulverization. Only two waterings are considered necessary before sowing, one before the first ploughing, the second immediately before sowing. If it rains on those two occasions, then it is not necessary to irrigate the land by well or canal water. Water of wells is considered much superior to canal water.

4. Seed sowing commences about the 15th Hár and continues up to the beginning of Sáwan. The date of sowing depends upon the setting in of the rains, where there are no wells to water the land. If the rains commence early, then sowing also begins accordingly; but if the rains are delayed, then sowing is delayed likewise. About four seers of seed is sown in a ghumáo. In some places the seed is sown in the way known as "kera," in which a person follows the ploughman, and goes on dropping seeds with his hand in the furrow of the plough, after which the sohaga is passed over the land immediately. In other places seed is sown in the way known as chatta, *i.e.*, by throwing it broadcast, immediately after which the land is ploughed once, and then the sohága is passed over the land. In the Shakargarh tahsíl generally, seed is sown in the latter fashion, and it is alleged by the zamíndárs of that tahsíl that seed sown by kera in those places does not sprout. Here and there some industrious Aráíns sow seed by putting it in the soil in the proper place with the hand. It is essential that one seed should be at a distance from the other. Ordinarily the distance of half a foot is observed. There is a proverb among the agricultural classes on this subject, which requires that the seed should be so far apart that a person can pass freely through the field, although covering himself with a quilt.*

Seed sprouts three or four days after sowing. If it does not rain, the field is watered, where practicable, about 15 days after sowing, and after about three or four days of sunshine, when the land is a little dry (*vattar*), Godi is done when the plant is only some inches in height. At this time the field is sometimes manured, if it was not properly manured before sowing. But the zamíndárs do not regard this after-manuring as so beneficial as the manuring before sowing. About 15 or 20 days after the first godi (loosening the earth and cutting up weeds with the hoe), the field is again watered if it does not rain; and again godi is done when the land assumes the *vattar* form. In the Pathánkot tahsíl, in several places, instead of the second godi, the land is loosened by means of the plough, and this process is called *halor* among the people.

Again some 25 days after this the land is watered if it does not rain, and godi is done at *vattar*. The land is again watered some ten days afterwards, at the time that the plant is going to produce cobs.

Near towns maize is sometimes sown even after the 15th Sáwan, where the land can be watered from wells.

5. The cobs begin to appear about the beginning or middle of Bhádon. Throughout the next month of Assú the cobs grow and ripen. In the month of Kátik the crop is cut. For three days after cutting, the plants are allowed to lie scattered in the field for drying. Then they are gathered together into large heaps (mohara), and are allowed to remain there from one week to three weeks. It is considered that the unripe cobs ripen while in the *mohara*, and that the grain acquires flavour. Afterwards the cobs are removed from the stalks (*tanda*) and the skin (*parda*) is taken off from the cobs. Then for about a week the cobs are dried in the sun. The grain is now separated by beating the cobs with sticks, or by treading out with cattle. When grain is urgently required, the cobs when they have ripened are removed from the plant without storing them in *mohara* and are dried in the sun and beaten with sticks. If the plants after cutting are piled in the *mohara*, without first being dried, the grain becomes bitter.

6. The yield per acre depends upon more things than one. It varies with the quality and site of the land, the crop that has preceded maize, the fallow allowed, the number of ploughings, manure and seasonable rains. If the quality of the land is good, and sengi or metha crop has preceded the sowing of maize, and the land is ploughed some 16 or 20 times, and treated with manure at the rate of 40 or 50 maunds a kanál, and seeds are sown at proper distances from each other, and there are seasonable rains, and godi is done thrice at the proper times, the land yields 24 or 30 maunds of maize grain in an acre. But as all the above named conditions do not exist equally everywhere, the yield ranges from 30 maunds to 4 or 5 maunds an acre.

* Sow kanguí seeds at the distance of the leap of a frog from each other, cotton at the distance of a club, and jowár (makki, maize) in such a way that one may pass through the field conveniently by covering himself with a quilt.

The Tahsíldar of Batála writes that an acre yields about 18 maunds of yellow maize and 14 of white. The Tahsíldár of Shakargarh gives the yield per acre to be from 22 to 29 maunds of yellow maize, and from 22 to 24 maunds of white. The Tahsíldár of Gurdáspur writes that the outturn per acre is from 5 to 12 maunds. The Tahsíldár of Pathánkot puts down the average yield per acre to be 8 maunds.

7. Bread is made of the grain and is consumed by the poorer classes generally in the winter season only. It is eaten to some extent by the well-to-do classes also. Zamíndárs, when they have to feed their labourers or servants from among the lower classes in the winter season, almost always give them bread made of maize or millet. They say that a Chuhra, whose hunger would be satisfied with a seer of maize, would eat two seers of wheat. To a considerable extent grain is eaten parched in towns as well as in villages. The cobs are also roasted when they are yet unripe. The grain is also boiled in water and eaten (in the form called *Baklian.*)

When the stalks are green, they are to some extent used as fodder for cattle, but when dry, the stalks are very seldom used as fodder, and then only when other fodder is scarce. Cattle do not eat the dry stalks eagerly. The stalks of maize are not considered to possess much nutrition.

In the Pathánkot tahsíl the stalks are used as fodder to a greater extent than in the other tahsíls. It is stated that in the Pathánkot tahsíl the stalks are of better quality and are sweeter than in other places.

The stalks are mostly burnt, when dry, for cooking food, or for boiling sugar-cane juice to make molasses (gur).

To the north of the Pathánkot tahsíl where snow falls, the grain keeps well for three or four years; in all other places, as a general rule, it keeps well for only a year.

8. Zamíndárs say that maize is not subject to any disease. The white ant (dimak) however, attacks the plant sometimes. Deficient, excessive and unseasonable rains also affect the crop. If there are deficient rains, the stalk does not bear any cobs; and if the rains fail and the land cannot be irrigated at the time that the plant is about to produce cobs, the cob is found to have grain only in a portion of it. If, on the other hand, there are excessive rains at that time, then the stalk grows to a great height, and it does not bear cobs, or if any, the cobs are of inferior kind, the grain is small and produce little.

If again water collects in the land in which maize is sown, the land becomes hard and the plant does not grow, but withers away.

9. Maize comes to maturity within three months of sowing. It does not require much rain or irrigation, but it is necessary that the rain or irrigation should be seasonable. It requires only five rains or waterings from sowing to ripening. If the land is watered, or if there is rain at the beginning of Sáwan, then the seed would be sown, and it would require to be watered once about the 15th Sáwan, again at the end of that month, then about the 20th of Bhádon, and lastly at the end of that month. On account of its being so dependent on rains, it is called by the people *Juláhí Kheti*, resembling the people of the Julaha (weaver) class in its dependence. The crop ordinarily flourishes best where the land can be irrigated when required from wells. As a general rule it stands in need of much manure.

Ordinary cultivators could have a greater outturn from their fields if they had the means which the first class cultivators have, to sink wells by which they would not be so dependent on rain as they now are, and if they were better off and could allow more fallows to the land, and if they had more manure, and if they could plough the land more often than they now do, and if they could sow senjí or metha in the land before cultivating maize.

The first class cultivators again could make improvement if they had better plough cattle, and better ploughs, and if they could be taught improved methods of manuring land and storing manure, and if their knowledge of rotation of crops could be increased, and of sowing seed by selection.

No. 768, dated 26th November 1884.

From—F. A. Robertson, Esquire, Settlement Officer, Ráwalpindi,

To—The Commissioner of Settlements and Agriculture, Punjab, Lahore.

I have the honor to submit a report on the growth of maize in the Ráwalpindi district, by Lieutenant Egerton, Assistant Settlement Officer, dated 1st October 1884, with appendix giving descriptive list of samples submitted with the report.

2. The samples consist of five selected and five ordinary cobs for each variety, but as specimens of some varities have not yet been procured, they will be despatched hereafter on receipt.

3. Column 3 of Appendix for Fattehjhang tahsíl has not been filled up, and the report has, on this account, been delayed for nearly two months; but as the information called for has not been received up to date, I have thought it inadvisable to further delay submission of the report. The necessary information will be supplied when received.

Copy of a letter, dated 1st October 1884, from Lieut. F. W. Egerton, Assistant Settlement Officer, to the Settlement Officer, Ráwalpindi.

In accordance with Circular No. 561, dated 19th March 1884, of Commissioner of Settlements and Agriculture, I have the honor to submit a report on the growth of maize in the Ráwalpindi district.

Varieties grown.

2. The two varieties of maize which are universally cultivated in every tahsíl in the district are the white, and the yellow, called respectively "Suféd," or "Chitti," and "Pili." Besides the above we find in the Murree tahsíl varieties called "Sattri," "Saithi," and "Kári."

The latter, "Kári," is also grown in the Ráwalpindi tahsíl.

The Attock tahsíl is the only tahsíl in which the American variety is grown. It is locally known as "Garma," but must not be confused with that called harámi or "Mausam Garma" grown in Pindigheb.

Circumstances under which preferred.

3. The two first named varieties, namely, "Chitti" and "Pili," are used for all purposes, without much distinction. The only variety which appears to be grown almost entirely for fodder is that called "Kári." It is not very good to eat, and thrives best in a cold climate.

In the Murree tahsíl preference is given to one or other of the five varieties there grown, according to the more or less elevated position of the fields and consequent alterations of climate.

That called "Saithi" only thrives in a cold climate, and has this advantage, that it can be cultivated in inferior lands.

In the Ráwalpindi tahsíl the variety called "Kári," owing to the superior nature of the soil, can be brought to greater perfection than in Murree, and is, in that tahsíl, preferred to "Pili." As a matter of fact, all the varieties grown are used for all purposes, and it is not customary to set apart any particular variety for making flour, for roasting or for use as a vegetable.

Terms locally used in cultivation.

4. Before proceeding to describe the year's course, it will be as well to explain terms locally used in cultivation, as these will constantly be referred to.

"Godi," a process consisting in loosening the surface crust of the earth, breaking up clods and removing weeds. This is performed with a "rhamba," "síl," or furrowing is sometimes substituted for "godi," as will be hereafter explained.

"Hail," manuring.

"Pássa," the heaps into which the cobs are collected for drying.

"Chhalli," the cob.

"Khosha," the cob.

"Garma," American maize (in Pindigheb, yellow country maize as distinguished from "Sarma.")

"Choka," hole made with "rhamba" into which the seed is placed (Pindigheb).

"Nolai," see "sil."

"Tánda," the stalk.

"Khalwara," "Kharman," threshing floor.

"Túkka," the core to which the seeds adhere, used as fuel.

"Chhaj," an implement like a dust pan, in which the seed is tossed to separate the chaff, &c.

"Karai," an implement by which the grain is tossed in the air so that the chaff may blow away. This has a handle, "Chhaj" has not.

"Húni," the beard of the cob.

"Káchh," (the young seed).

"Ganji," a core on which few seeds adhere.

"Kirai," a blight which succeeds heavy rain.

"Dhanian," a "masala" sometimes sown between the maize plants after the last "godi."

"Sawank," a variety of coarse grass which springs up in Sáwan and has to be carefully extracted.

"Bujja," see "passa," a heap of cobs.

"Sullu," the young plant on first appearance.

"Tarar," see "sullu."

The yearly course.

5. Maize (makkai) is in most parts of the district preceded and succeeded by barley, and except in chahi or well-watered lands, it is usual only to take one crop off the land in the year.

An exception, however, is found in Pindigheb, where two varieties, one in the rabi and one in the kharíf, are sometimes taken off the land in the same year.

In some parts of Fattehjhang a barley and a maize crop are taken off the land, and in this tahsíl tobacco is sometimes alternated with maize, but the custom is not general.

It is generally admitted that wheat does not do well alternated with Indian corn, and especially in the Murree tahsíl where the soil is poor; if sown after wheat, the maize crop is a failure. Similarly, wheat cannot succeed (makkai) maize, though only one crop be taken in the year.

System of husbandry.

6. The systems of husbandry differ so much in different tahsíls, that I shall be compelled to discuss them separately.

In the Ráwalpindi tahsíl maize is sown on the 1st July in "Lipára" and about the 15th July in "Cháhi" or well-watered lands, and "Nahri" or canal-watered lands.

The seed germinates in three or four days, and the first "godi" is effected in about ten days from sowing.

At this time water is also turned on in irrigated lands.

When the land surface is caked after watering, a second "godi" or loosening of the surface soil is effected. Before the crop reaches maturity, the land is also furrowed (síl) three times.

Irrigated lands are ploughed three or four times, and báráni lands eight times before sowing. This differs directly from the system pursued in the Murree hills, where only two ploughings are effected. Manure is applied before sowing in all lands in this tahsíl (Ráwalpindi), and, indeed, with very few exceptions, this is the general custom in the district, the outturn depending to a great extent on the richness of the soil.

The cob or "Bhutta" (chhalli) is fairly matured in 60 days, but is left for ten days more before the stalks are cut down. The cobs and stalks are then collected in heaps called "pássa," and exposed to the rays of the sun for 15 days. The cobs are then separated from the stalks and placed in the threshing floor, and the seed is either beaten from the core with clubs or removed by the trampling of cattle.

In Fattehjhang tahsíl, the wheat or barley (generally barley, but in this tahsíl it is sometimes the custom to alternate wheat and maize) being reaped about the last day of April, the land is then left fallow for a month. In June the land is ploughed and manured, and after this, as soon as the rain-fall comes, three or four times more. Sowing takes place from the 1st to the 15th August.

If the rain-fall is not opportune and the land irrigable, it is flooded seven days before sowing. In "cháhi" lands weekly waterings take place till the crop is matured. "Godi" is effected fortnightly, but if the rain-fall is plentiful, ordinary weeding is substituted.

The crop matures in about $2\frac{1}{2}$ months.

In the Attock tahsíl American corn is cultivated by the Malliárs (Aráíns) of Sarwála, and is sown in May to June and reaped in July to August. At this season the indigenous varieties cannot be cultivated. The land is ploughed three or four times, and manured before sowing. If at the time of ploughing, and before sowing-time, no manure is procurable, manuring is effected when the crop is about a foot high.

If there is not an opportune rain-fall, it is usual in irrigated lands to water before sowing. "Godi" is effected when the crop is half grown, and again when about a yard high, and when the cob is formed in irrigated lands; but in "báráni" lands, furrowing (sil) is substituted for "godi" when the crop is 18 inches high. Sowing of the native seed takes place from 23rd July to 2nd August.

The cobs form about the middle of October and reach maturity at about the end of October.

The stalk (tánda) is then cut and collected in heaps (pássa) and exposed for a fortnight to the sun. The cobs are then separated from the stalk and peeled. The white variety requires plenty of manure.

"Dhanián," a sort of "masála," is occasionally sown after the last "godi," but then the crop is not succeeded by barley.

In Pindigheb tahsíl maize is sown about the 11th of May, and reaches maturity about the 5th of August. Sometimes maize is again sown in the kharíf, ripening about the 12th December. When maize is alternated with wheat, the land is left fallow for a crop in between, *i.e.*, dofasli dosála system. When the wheat has been reaped, the land is watered and ploughed, and the yellow makkai, called "Garma," sown. It is cleared about the 6th August. The system of sowing is as follows:—

The land is watered, and when the surface has caked, it is ploughed and harrowed and the clods are smashed up. The land is then furrowed and holes called "choka" are made with a "rhamba." Two or three seeds are dropped into each hole. "Godi" and the destruction of insects have to be regularly effected. The hot weather crop is always poor, and, as has been mentioned, good successive crops of wheat and makkai are not generally obtained.

Very often the hot weather crop of maize is succeeded by "bájra" in the kharíf. A plough with two cattle is worked by one man. Manuring is generally done before the cold weather crop of maize, and always before planting wheat or barley. This suffices for the whole year's course. Two or three days after the appearance of the crop, it is usual to water it and "godi" is effected. Useless or poor plants are removed and given to the cattle.

The hot weather crop matures about the 28th of August.

The crop is then cut and collected in heaps, "pássa."

The seeds are allowed to dry in the skin, and the "pássa" is watched at night.

When dry, the cobs are separated from the stalks, and after two or three days' more exposure the seed is beaten from the core with clubs and the best seed set apart for sowing. The grain is winnowed, the core used for fuel, and the stalk given to the cattle. The Malliárs of Akhlás grow a fine cob. Good land and good husbandry are both required.

In Murree tahsíl the land has to be highly manured in the more elevated tracts.

Sowing takes place in May and June. Except in the lower lands, where the climate is warm, the crop does not mature for four months; in these lands the variety called "Sattri" is grown, which ripens in 60 days. There is no rotation of crops in this tahsíl, as far as maize goes. It is generally sown once a year in all manured (lipára) lands. If the land becomes impoverished, it is allowed to lie fallow for a year, or potatoes are tried. Only two ploughings are effected before sowing, more than two ploughings is deleterious.

Manure is put in in July, August and September. The snow then falls and causes the manure to percolate the surface soil. After the snow has disappeared, the land is furrowed for sowing, which is done broadcast, eight seers sufficing for one kanál. "Godi" is effected soon after the appearance of the crop, and furrowing "sil" when the plants are a foot high.

"Mothi" for cattle is sometimes sown along with the maize, and grows with it, the proportion being $\frac{1}{4}$ mothi to $\frac{3}{4}$ maize.

After exposure in the "pássa" for 15 days after reaping, the seed is beaten off the core with sticks.

Sowing is always effected after a seasonable rain.

Estimated yields.

7. I shall give the estimated yields in the form of an appendix.

General remarks.

8. The most successful cultivators of maize are the Malliárs or Aráíns, a most industrious class and the best cultivators in the district.

Their success is obtained by constant ploughing before sowing.

Assiduous attention to the crop by weeding, "godi" and "sil."

CARE IN THE SELECTION OF SEED.

The finest seeds of the finest cobs are most carefully preserved for next year's sowing. In going about the district, I have frequently been struck with admiration of the way in which the Aráíns cultivate their maize. One of their "khets" of makkai about a foot high in appearance bears about the same comparison to that of an inferior cultivator, that a British Regiment in column would to a street rabble. The Awáns are also successful cultivators of maize, and very nearly rival the Malliárs. Of course, in maize cultivation, the amount of manure available, timely rain-fall, and a judicious rotation of crop, are all most important factors, but what is required to improve the quality of the maize grown, is a careful selection of seed by the cultivator, and the fostering care displayed by the Malliár in bringing his crop to maturity.

Copy of a docket No. 194, dated 17th December 1884.

From—Captain J. A. L. MONTGOMERY, Settlement Officer, Hoshiárpur,

To—Lieutenant-Colonel G. G. Young, Commissioner and Superintendent, Jullundur Division.

IN accordance with printed Circular letter No. 561, dated 19th March 1884, from Commissioner of Settlements and Agriculture, has the honor to forward a report on maize cultivation with prescribed statement and four bags containing different varieties of maize.

Report on maize cultivation in the Hoshiárpur district.

1. Practically the only kind grown in the district is the ordinary yellow maize, it is sometimes called *chhalli*, sometimes *káthi*. Red cobs are occasionally found in a field among the yellow ones, or sometimes a yellow cob is found with red grains in it. But the red kind is never cultivated as such. The yellow maize also sometimes has a lightish colour on the outside of each grain; this is called *dhusar*, and is said to be softer and to have more substance in it. The white maize is very uncommon. Where found, it is preferred to the yellow maize to be eaten, roasted before quite ripe. This is a very common way of eating maize generally, before it has quite ripened. The unripe cobs are also given to cattle and horses, and are said to be especially good for milch kine. When ripe the grain is either eaten, parched whole, or after being ground into flour.

Varieties grown.

2. The richer the soil, the better for maize. It is generally grown on the well manured fields, near a town or village, or in naturally fertile land, such as is described here under the names *chhal* and *maíra*. The former contains a fertile alluvial deposit and requires no manure; on the latter it is usual to apply plenty of manure. Maize often follows sugar-cane, cotton, hemp, wheat or barley; and after it has been cut, if it was sown alone in a field, it is frequently followed by wheat, or wheat and gram mixed, barley or barley and masar; but if the land is unirrigated, and the rains have stopped early, or if maize has been sown mixed with másh or múng, or such late ripening crop, a rabi crop cannot always succeed immediately, and in this case the next crop is generally sugar-cane or cotton, or perhaps maize again the next year. So much manure is as a rule given to the land for maize that, except for sugar-cane; it is not usual to give fresh manure to the succeeding crop.

System of husbandry.

3. It is not usual to plough the land many times for maize, and the crop being a surface feeder, deep ploughing also is not resorted to. Three or four ploughings are generally considered sufficient. Except on *chhal* land, the manure applied amounts to as much as 40 maunds the kanál, or 400 maunds the acre. The greater part of the maize of this district is grown on unirrigated land. If irrigation is available, it is sometimes applied to stiff soils to admit of ploughing, but it is only resorted to for sowing in the vicinity of towns where maize is grown early. It is very common to plough the land in its dry state in May or June, before the rains have fallen; this is called *karsa*, and it is possible, because most of the land of the district has a good deal of sand in it.

Ploughing, irrigation and manuring anterior to sowing.

4. The seed is generally sown after the first fall of rain in June or July; but in the hills it is sometimes sown in the end of May. As before mentioned, it is often sown still earlier near towns, that is in March or April, so that the cobs are sold in June or July. Frequent weedings and hoeings are necessary, the first hoeing being given 10 or 12 days after the seed is sown. When the plants are a couple of feet high, the plough is driven between them, the process being called *halud*. One of the main objects of the first hoeings and of the *halud* is to eradicate all young plants which happen to be growing too close together. The saying is that the hoeing should be done by a man's enemy, who has no regard for the plants. When the plants have attained almost their full growth, good cultivators give the field a final hoeing. The crop thrives best with moderate and constant rain with alternating sunshine; both drought and too much rain do harm. There is no scruple about re-sowing a field with maize, if the first or second sowings are unsuccessful, and sowings are sometimes made as late as August, but in such a case there is small chance of a successful outturn. The end of June or beginning of July is the best time for sowing. It is wonderful how maize, which looks as if it were quite withered up after a spell of drought, revives after rain. There is a saying—

Treatment of field from sowing to ripening.

> Jowár dhabe ta has has bahe
> Kanak dhabe ta ro ro pae,

which may be translated—

> When maize droops (the farmer) laughs,
> When wheat is laid he laments.

5. The ordinary sowings ripen in September or beginning of October; later sowings correspondingly later. The stalks are generally cut off a foot from the ground, tied into bundles, and left in the field for a day. They are then stacked in one place for a fortnight. In some places, where irrigation is available, it is the practice at this stage to irrigate the land round the stacks; this is done more especially in the Manjki in Jullundur, and is said to increase the size of the grains. Afterwards the cobs are taken off the stalks, stripped of their encasing sheaths, dried, and then the grains are separated either by beating with sticks or the treading out of oxen.

Harvesting operations.

6. The yield varies very much with the quality of the soil, amount of manure used, and the nature of the season. The experiments carried out in this district for four years, principally on unirrigated land, show an average yield of about 11 maunds an acre on 416 acres. If everything is in its favour, an outturn of 20 maunds is not uncommon on good land. On the other hand, in a bad year, or with careless cultivation, it may not be more than three.

Estimated yield per acre.

7. The grain is practically all consumed in this district, scarcely any being exported, as it is the main food of the agriculturists in the winter months. The stalks are given to cattle soon after they are cut; the cattle eat off the leaves, and the dry hard stalks are used for firing.

Consumption of the grain and stalks.

8. Soon after the young shoots come up, a small hairy red caterpillar, called *kutra*, appears, and frequently does much harm in eating the tops, but it generally disappears after 10 or 12 days. The *bhúndi*, a grey winged insect, also damages the young shoots. There is an earth worm, called *garuna* or *gut*, which destroys the roots; and in dry weather white-ants also attack the roots. Rats, squirrels, birds, jackals, pigs and monkeys are all fond of the crop and have to be guarded against.

Diseases, &c., to which the crop is liable.

9. The people generally quite recognize that maize should be well manured, and the plants should be at a good distance apart. In fact the *halud* is intended to destroy all plants growing too close together, and the saying is that a man should be able to walk through a maize field with his sheet wrapped round him. But it is not every cultivator who is careful in this matter, and fields are often seen where a man has sown his maize rather thick in the hope of a larger outturn. He thus probably gets more fodder, but certainly less grain. Again perhaps there is not as much care bestowed as should be on a good selection of seed. A man will generally keep his best cobs for seed, but he will not often seek for still better cobs elsewhere in order to introduce a better and stronger maize.

General remarks.

The following kinds are forwarded with this report:—

(1) Ordinary yellow (chan or káthi)	...	5 good cobs.
(2) Whitish yellow (dhusár) ...	...	5 average.
(3) White	...	5 ,,
(4) Red	...	5 ,,

10. The Rev. Mr. Carleton sent me some yellow and white seed from Kotgarh this year, and I distributed it to a good many zamíndars. Unfortunately, there was a prolonged drought soon after most of the sowings were made, and in most places the experiments were failures. In a few places, however, they did very well, and the outturn in these cases, both in the number and size of cobs, was decidedly better than with the ordinary maize. But even then the grains were apparently not so large as the seed grains. Perhaps the greater heat of the plains is accountable for the deterioration. I do not think there was any deficiency of manure. One objection to these varieties is that they take longer to ripen than the ordinary country kinds; and as they cannot be sown earlier than the ordinary kinds, except on irrigated land, there is less chance of the cultivator getting a succeeding crop from the same land. But the people are very anxious to give a further trial to these larger kinds, and it would be a boon if a good deal more seed could be obtained for distribution. I have had many applications for the seed of late.

American maize.

No. 5, dated Jullundur, 6th January 1885.

From—W. E. PURSER, Esquire, Deputy Commissioner of Settlement, Jullundur,

To—The Senior Secretary to Financial Commissioner, Punjab, Lahore.

Introductory.

I HAVE the honor to submit the report on maize called for in Commissioner of Settlements and Agriculture, Punjab's printed No. 561, dated 19th March 1884.

Names and varieties of maize.

2. In this district maize is almost invariably called *chhalián*, but the name *makkí* is thoroughly understood; and when the people speak of *jowár* they mean maize, and not great millet (*Holcus sorghum*), which is grown only for fodder, and is called *chari*. The different kinds of maize grown are detailed in the accompanying list of samples forwarded herewith. The bulk of the crop consists of one kind, as far as I can judge, locally known as *láll káthí*, *makkí* or *chhan*.

Soils suited for maize.

3. Maize is not grown in unirrigated land, except where the soil is naturally moist, owing to the proximity of the Sutlej or to the influence of hill streams, as in the north-east portion of the Jullundur tahsíl, a tract of country known as *Sirwál*, elsewhere irrigation is absolutely essential. The soil selected is the most highly manured that can be got, and is generally in the immediate vicinity of the homestead. Maize requires a great deal of manure, and every other crop must wait till its wants have been supplied. It is one of the three staple crops of the district, the other two being wheat and sugar-cane. Broadly speaking, it may be said that maize supplies the cold-weather food of the people, wheat the hot-weather food, and cane pays the revenue. Maize is almost invariably grown in *do-fasli* land, or such as produces two crops in the year. It is preceded by wheat or some fodder crop as *sinji* (melilotus parviflora) or *metha* (trigonella fœnum græcum), and is followed by them too. As wheat is an exhausting crop, barley sometimes takes its place when it is an object to spare the soil. Sometimes the crop is preceded or followed by cane, and occasionally cotton is grown. At the beginning of the cold-weather *sinji* is sown among the standing bushes, and this is followed by maize. But the usual course is wheat or fodder, maize, wheat or fodder. In the Sirwál we generally find maize preceded and followed by wheat. On river lands the course is less certain, as the quality of the soil is constantly changing owing to river-action; but where changes occur rarely, the usual procedure is to precede and follow maize by wheat or fodder, or *masar* (lentils—*ervum lens*).

Course of husbandry.

System of cultivation previous to sowing.

4. The system of cultivation practised on irrigated lands is as follows. As soon as the work of the spring harvest is advanced sufficiently to allow the zamíndárs some leisure, manure is carted out to the field and left there in heaps. Ten cart-loads go to an acre. If the cart-load is taken at 12 *maunds*, this would give about 4½ tons to the acre. The manure is the usual farmyard refuse. As the maize fields are near the homestead, they benefit from the native system of dispensing with fixed latrines. The manure ought to be carted out, and on the ground at latest by the middle of Hár, or about the end of June; as the rains may then break at any time, and as soon as they do, ploughing begins. As usual, accounts vary much as to the number of ploughings given. But I think three or four is a fair allowance. When seed time approaches, the manure is spread and ploughed in. The field is then rolled and ploughed, and the seed dropped into the furrows by hand. Another rolling follows, and irrigation beds are formed. About eight *seers* of seed go to an acre.

Sowing.

The proper seed time is the 20th of Sáwan (about August 2nd), and the following five days. But a few days before or after make no great difference. The farmer always hopes to be able to do his ploughing and sowing on rain, but if the rains hold off, he has to irrigate. In 1883 the crop was very generally sown after irrigation. Maize is sown thick, though the rustic saw deprecates this procedure, and says the plants should be so far apart, that a man could walk through the field wrapped up in a wadded quilt without touching them (*lef di bukkal márke chhalián wich dí já*). The plant appears

Irrigation after sowing and weeding.

above ground in about a week, and if there is no rain a watering is needed. After about another week the field is weeded with a *khurpa* or chisel-shaped trowel, or in the Sirwál with the cane hoe. Another weeding should take place in about a fortnight afterwards, and a third about the end of September; but the last is very commonly omitted, and sometimes a ploughing is substituted for it in the Sirwál. The amount of irrigation needed depends on the season, but the crop requires much moisture, and if rain is not ample water must be supplied artificially. When the plant is two to three feet high, a watering is usually given to consolidate and strengthen the lower stalk (*panja*). About the middle of September, the young cob begins to form, and from this time till the crop ripens, which happens in about five or six weeks, it is irrigated a couple of times. The 20th of Kátik (about November 3rd), is generally given as the date on which maize ripens; but, of course, it is impossible to be exact to a day, and the date has been probably fixed because it is just three months from the 20th of Sáwan, and the crop is popularly supposed to take just three months to mature from the time it is sown. Some little maize is sown in Hár (middle of June to middle of July). This ripens in Asú (middle of September to middle of October), and is only used roasted. The cob is roasted in a fire, and the grain is eaten off the cob.

Fencing and watering.

5. Maize is generally fenced. Each field is not separately fenced, but the large blocks in which it is grown. Very commonly a row or two of great millet is grown round the field. This is partly to secure good seed for the *chari* crop, and partly to protect the maize from passing cattle, whose ravages do not penetrate beyond the millet. When the grain forms, the crop has to be watched. Birds and, along the river, pigs are the great enemies of maize in this district, as other noxious animals, such as deer and jackals are few. Birds are scared from a platform. For this purpose slings are used. Hardly any diseases of maize are mentioned. In its early days it may suffer from caterpillars (*sundhi*), from a disease called *ukherá*, in which the roots dry up. It is also liable to be laid by the heavy storm of wind, a sort of equinoctial gale, called *agath*, with which the rainy season generally closes. If sown late, maize will not ripen, as the sun is not strong enough, and the plant runs a good chance of being killed by frosty November.

Injurious influences to which maize is exposed.

Cutting and threshing.

6. The stalks are cut close to the earth with a sickle, and left on the ground as cut for a day. They are then formed into shocks to dry. The shocks are of a convenient size for this purpose, and have the heads of the stalks pointing upwards. After about a fortnight the whole plant is brought to the owner's house, where the cobs are extracted from the sheaths, and the grain separated from the stalk of the cob (*gul*) by threshing with sticks. Cattle are rarely used for this purpose. After separation the grain is dried in the sun. In many cases the extraction of the cob takes place in the field. The cob consists of three parts grain and one part stalk (*gul*). by weight. The *gul* is used for fuel.

Consumption of stalks and grains.

7. Accounts differ very much as to the value of maize for fodder. Some say it is quite useless, others say it is good food, but only for milch cattle. My opinion is that the hard stalks are rejected by cattle, and are good only for fuel and manure, but that the leaves are good for milch cattle, and the thinner parts of the stalks are fair fodder, though inferior to great millet. Maize is practically never fed green to cattle. A zamíndár would cut down all his cane for this purpose before touching his maize. The grain is used in four ways. It may be roasted as before mentioned; or it may be coarsely ground and boiled as porridge; or it is parched in an oven, or is ground into meal and made into cakes. The last is the usual method of use; and it must be admitted that a maize-cake is a satisfying, if rather dry food, and affords much exercise for the muscles of the jaws. The first and second methods are rarely followed; but in the cold-weather evenings the public ovens of the grain-parchers are a prominent feature of village life. The meetings round them take the place of our "afternoon tea."

Estimated yield per acre.

8. In the accompanying list of samples the yield of maize is given. The figures refer to the average maximum and minimum with reference to system of cultivation, the maximum represent-

ing manured and irrigated maize, and the minimum unirrigated maize. It is impossible to say how high the maximum yield may be. I think it may possibly extend to double the average maximum given in the list, or to nearly a ton and a half per acre, but such a yield would be most unusual. The minimum may be anything above *nil*. The purple cobs (*sampleg*) are found among ordinary maize, and do not form a separate species. The grains of them will not produce purple cobs, I am told. The people do not seem to think them better or worse than the ordinary yellow cobs, and have no superstitions about them; which is, perhaps, an argument in favour of maize not being indigenous.

No. 33, dated 2nd February 1885.

From—Colonel W. G. Waterfield, Commissioner and Superintendent, Peshâwar Division,

To—The Senior Secretary to Financial Commissioner, Punjab.

Referring to Commissioner of Settlement's Circular No. 561, of 19th March 1884, forwards in original, after perusal, the report of the Deputy Commissioner, Pesháwar, on maize cultivation. Samples of the grain are also sent.

Maize cultivation, Pesháwar District.

1. Generally speaking only one kind of maize is cultivated in this district, *viz.*, the white variety. In the báráni tracts the yellow is sometimes found, but the area under yellow maize is comparatively small. In the Pesháwar tahsíl and sporadically elsewhere also, the red variety is found, but is not, as a rule, sown deliberately, and can hardly be looked upon as a distinct variety. Specimens of each kind are herewith forwarded. The white variety is preferred to any other in this district, as it is softer and sweeter than the other kinds. It requires more careful cultivation and irrigation than the other varieties. The ears are often cut off in the unripe stage and roasted for eating, and the stalks, both in the dry and green state, are given as food to cattle. In the neighbourhood of Pesháwar and other towns whole fields are thus cut down before attaining maturity. The varieties are used indiscriminately for the purpose of food, but the white variety is perhaps preferred for roasting. Unripe cobs of maize are sometimes eaten after being boiled. In this district the unripe cobs are also given to horses and sheep to fatten them up. The grains of the ripe cobs are also separately roasted and eaten. During the winter months, bread made of maize grain (cooked in ovens) forms the ordinary food staple of the poorer classes.

2. In báráni and sailábi lands on which, as a rule, only one crop is grown each year, maize is seldom sown. On ábi lands producing a double crop in the year, the cultivation of maize is made to alternate with wheat, barley or masúr. Maize is not an exhaustive crop, but in case the soil gets weakened from any cause, either the maize stalks are left in the ground to a height some 1½ or 2 feet, and therein rotting act as manure, or a crop of lucerne or beans is cultivated in rotation to maize which is said to have a strengthening effect on the soil. This last, however, is seldom resorted to.

3. In Baisákh or Jéth, after harvesting the wheat or barley crop, the land is irrigated and then ploughed up three times at intervals of four days, the land is then again irrigated and ploughed up the fourth time while moist. The seed is then sown and the soil harrowed over it, manure is not put in before the seed is sown.

4. Date of sowing varies from 20th Hár to end of Sáwan. Seed is sown while the land is moist, four days after irrigation. The seed is thickly sown, about 20 or 25 seers per acre being used. A week after the crop has sprouted, manure is scattered round the roots of young plants—about 10 "Borás" per acre are used. The crop is then weeded (including the softening of earth round the roots) and irrigated. In Pesháwar tahsíl weeding is not much in vogue. In Mardán and Utmán Bolak the zamíndárs are more careful in this particular, and weed out their crops at least twice. In taking out grass or rooting up the unnecessary stalks to feed cattle, the earth round the roots of the crop gets softened of itself. When the cobs begin to form, the crop is thinned; the stalks without ears (shándah) and those too close together being weeded out. It is a golden rule with the zamíndárs that the maize crop should be irrigated

once in seven days, but in any case the crop should not be irrigated less than six times if rain has net fallen or four times if it has. In the Yusafzai sub-division more irrigation is required than other parts of the district. The crop, when getting mature, is carefully tended by a chaukidár, who remains in charge day and night. Generally the boundaries round the crop are raised to a considerable height to allow of the collection of the rain or irrigation water. In báráni lands careful weeding and turning up the soil round the young plants is required to secure even a tolerable crop.

5. In Asoj, after the lapse of three months, the cobs begin to form, and the crop is reaped in Kátik. After the stalks are cut down, they are left for a few days in the field to dry. They are then stripped and stacked near the threshing floor. After the lapse of some ten days the cobs are cut off, peeled and arranged on the threshing-floor in heaps which are stirred every other day. When they are thoroughly dry (after some 10 or 14 days), they are threshed out with thick sticks; the grain is tossed up in the air with hoes and submitted to the winnowing action of the wind.

6. Estimated yield per acre of grain :—

Maximum.	Minimum.	Average.
59 Mds. ...	6 Mds. ...	20½ Mds.

Estimated yield per acre of stalks—

95½ Mds. ...	9 Mds. ...	32 Mds.

Estimated yield of cobs from which the grain has been recovered (Túkka)—

9½ Mds.	1½ Mds.	5¼ Mds.

7. The dried stalks are given as food to cattle. They are often also used as manure, either alone or mixed with cowdung. The grainless cobs are only used for fuel. Bread is largely used by the zamíndárs and poorer classes made of maize flour, epecially in the winter months. The unripe cobs and ripened grains are eaten roasted; unripe stalks are given as food to cattle, especially buffaloes, bullocks and horses. The cobs, too, are often eaten boiled.

8. The following are the principal diseases affecting the maize crop, *viz.*,

White caterpillar (Pishakai) eats the young stalks.

Red caterpillar, (Changu Hangu) eats the young leaves.

White caterpillar (Spin Chinjai) feeds on the cobs.

Channab, drying up of crop when the cob begins to form in middle of Asoj, said to be caused by violent gales that blow during that month.

Wachor or jal, drying up of plant from want of water.

9. The zamíndárs of this district are not hardworking or careful cultivators. There is great room for improvement in the condition of the maize cultivation, which is not nearly so far advanced as it is down country. If more care was taken to manure the ground carefully, especially before sowing, and to sow the seed less thickly, to weed out and keep the crop clean and the soil soft, great improvement might be effected. The people, however, are so conservative and wedded to their antediluvian methods of husbandry, that there is not much prospect at present of a change for the better, and I do not think it is likely that new imported varieties would find favour with them.

It is worthy of remark, that in the Utmán Bolak, and to a less extent in the Mardán tahsíl also, maize is cultivated as a rabi crop.

Very often a line of "Narai Jowár" (sorghum) is planted round the maize fields for protection. Very rarely radish, in the case of ábi lands, and mustard in the case of báráni, are mixed with the maize crop. A curious circumstance in connection with this enquiry, is that Tuesdays, Wednesdays and Thursdays are considered unlucky days for the cultivation of maize. It must

not be forgotten that at least one-fifth of the value of the whole crop should be deducted, when calculating the net profits of the landlord and tenant, on account of the consumption of cobs and stalks before the crop is cut and the wages paid to coolies for helping to bring in, thresh, or clean the grain. Cobs are often found containing both red and yellow grains, and red cobs are sometimes produced from yellow seeds.

This report has been furnished by Mr. King the Revenue Assistant.

No. 78, dated Karnál, the 23rd February 1885.

From—J. M. Douie, Esquire, Settlement Officer, Karnál-Umballa,

To—The Junior Secretary to Financial Commissioner, Punjab.

With reference to Circular No. 561, dated 19th March 1884, from the Commissioner of Settlements and Agriculture, I have the honor to submit a report on the cultivation of makki in the tract at present under settlement.

Area under maize.

2. The following statement shows the area under makki in kharíf 1883-84 in each of the tahsíls under my charge. The acreage on which the crop failed cannot be stated for 1883, as the area of failure was not recorded by *crops* in that harvest.

Tahsil.	Year.	Area sown.	Area reaped.	Area on which crop failed.	Detail of area reaped.				
					Cháhi.	Abí.	Nahri.	Sailába.	Báráni.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Jagadhri	1883 ...	...	16,176	...	644	513	441	746	13,832
	1884 ...	23,066	19,315	3,751	35	13	1	1,211	18,055
Pipli	1883 ...	...	11,259	...	2,423	392	78	2,952	8,307
	1884 ...	26,668	23,258	3,410	150	31	...	8,137	14,940
Indri	1883 ...	...	6,170	...	2,477	271	123	856	2,423
	1884 ...	11,288	10,487	801	188	5	51	917	9,324
Kaithal	1883 ...	...	683	...	564	6	2	96	15
	1884 ...	1,034	954	80	448	1	31	189	285

In Jagádhri the area sown in 1884 formed 21 per cent. of the whole kharíf cultivation, in Pipli 19 per cent., in Indri 15 per cent., and in Kaithal —per cent. In Kaithal makki is little grown, except in the tract lying to the north of the Ghagar known as the Powadh, in which the soil is a light easily worked loam, and where water lies near the surface.

Extent to which grown as an irrigated and unirrigated crop.

3. The figures for the two years present a curious contrast. The year 1883 represents the result of a very bad rainy season in which the báráni makki is almost entirely lost, and the wells are strained to the utmost to save the crops sown in the cháhi lands. The year 1884 on the contrary shows how, in an exceedingly good year, the cultivator escapes the necessity of putting up his well gear at all for the watering of the kharíf crops. He always hopes to be able to raise his makki without working his well. If the rainfall is insufficient the crop is watered, as far as possible, from the tanks near the village. A channel is dug from the tank to the field, and the water lifted and thrown on to it by means of a rude basket made of thin strips of dhak wood. It takes two men to work such a lift, and the labour is severe. Irrigation of this sort has been recorded as abí in this settlement, but it is very frequently merely auxiliary to well irrigation. In the sub-montane tahsíl of Jagádhri makki is grown almost entirely in land unprotected by wells. In Pipli a great deal of báráni makki is grown in the alluvial lands lying between the Markanda and the Umla and in the Khadir of the Jamna. In Indri a good deal is raised in the Khadir. Where makki is grown as a rain crop it is usually mixed with úrd or with the

inferior variety of the same pulse which is known as "úrdi or mari úrd." The advantage of growing the latter with makki is that both crops ripen at the same time and the ground is cleared in the end of Asoj (about 10th October), while úrd ripens a month after makki. Báráni makki is rarely manured. When raised as a well crop, makki is usually sown unmixed with any other grain in the belt of richly manured well land round the village site. It is not much grown on the outer or jangal wells, because manure cannot be carried so far, and the protection of the crop from wild animals is very difficult.

Varieties grown.

4. Three varieties are known—

(1) Pili makki (yellow.)
(2) Dhauli makki (white.)
(3) Makka.

The third is a larger and finer variety than that usually grown. It appears to be either white or yellow. It is sown to a limited extent in the Pipli, Khadir and in the Markanda Bet. But it ripens late and requires too much moisture ever to become a popular variety. The ordinary white makki is much commoner than makka, but it, too, is rare except in the riverain tracts. It requires more water and ripens a fortnight later than the yellow variety. The latter fact prevents its cultivation on the well lands outside the riverain tract. For it is the object of the cultivator to get his makki off the ground as soon as possible, so as to have as much time as possible for the preparation of the ground for the crop of toria, barley, or wheat which is to follow it. White sells at a somewhat dearer rate than yellow maize, as natives, like Englishmen, admire white bread; but I believe the people generally prefer the taste of the yellow maize flour, though they would, if possible, put bread made of the other before a guest. Red maize is not grown as a special variety, though a few red cobs are often found in a field of yellow maize. One finds the yellow gradually shading off into the red, but the reason of the change of colour I cannot profess to explain.

Rotations.

5. When makki is sown in the highly manured land round the village, it is followed immediately by barley, post, wheat, carrots, or by toria, kasumbha and gram grown as a mixed crop. It is very common for the cultivator to put in about one-third of an acre of carrots per yoke of bullocks, and a little kasumbha is often sown at the same time. The carrots are sown while the makki is still standing, the ground between the stalks being prepared by the hand hoe or *khurpa*. In a year of drought a great increase takes place in the area under makki succeeded by carrots, for the zamíndár having little or no chari must raise as much green stuff as he can to keep the bullocks alive, while he eats the roots himself. The sowing of toria, kasumbha and gram after makki appears to be characteristic of a year of heavy rainfall like the present. The toria will probably ripen without watering or with a single watering from the tank, and as it ripens in January, and its seed fetches a high price, the zamíndár, at least in Karnál, looks to it largely as a means of paying his kharíf revenue. In Pipli *post* very commonly follows makki. But the crop which most commonly succeeds makki everywhere is barley, though, where cultivation is high and the zamíndárs are industrious, its place is often taken by wheat. If barley is put in, part of it is often cleared off the ground early and a little tobacco or onions sown. But it is more common to put in tobacco after cotton. After the rabi crops have been cut, makki can again be sown. When sown in báráni land makki is rarely manured, and is cultivated as the only crop of the fasli year (kharíf—rabi) in which it is raised. After cutting the makki and the crop of úrd which is mixed with it, the land will lie fallow either till the next kharíf or to the rabi following that kharíf. When sown in flooded lands makki is often do-fasli, being succeeded by jau-masri or gram, which again can be followed by makki. When grown on jangal wells it is often succeeded by gram, after which the land will lie fallow for a harvest. But, as already remarked, it is not usual to sow makki on well lands outside the manured belt round the village site.

Preparation of land for crop.

6. As soon as the harvesting of the rabi is completed, the cultivator begins to plough the well lands which he intends to put under makki. In Jeth (May—June) he ploughs four times

passing the *soháqa* over the land after each second ploughing. In the beginning of Asárh he possibly ploughs the land again twice, and again passes the *soháqa* over it. When the rain falls, he ploughs, sows, and ploughs again to settle the seed well in the ground, and again presses the surface flat with the *soháqa.* Altogether in gora cháhi land, from six to eight ploughings are given. After this the field is divided into beds with the *jandra* or wooden rake. In Jeth, before the first ploughing, he puts as much manure on to the land as he can spare and ploughs it in. Where manure is plentiful and the people are industrious, as much as 60 cart-loads, or from 600 to 720 maunds, equal to 30 or 36 tons, per acre are put in, but on an average probably only half of this quantity is applied to the land. The success of the crop depends on liberal manuring, and the manure put in, in Jeth, is intended to do, not only for the makki, but for the rabi crop which will succeed it. One sometimes finds wheat, when sown after makki, manured, but this is rare, and I have not noticed it among the best classes of cultivators. Of course poppy, tobacco and onions have to be separately manured. When sown in báráni ground the first ploughings for makki are given after the Christmas rains, and the land is ploughed altogether from six to twelve times. The land is rarely manured. In land which is flooded or permanently moist from the vicinity of a stream or canal, the number of ploughings given is about the same as in well irrigated land, and it is unusual to put in any manure.

Time of sowing.

7. The seed is sown when the first rain falls in Asárh (June—July). It thought to be in the ground about the middle of the month, and if it is not in by the end of it, the outturn will be inferior. The seed is sown broadcast, and, as I have already noticed, the land is ploughed after sowing to settle the seed properly in the ground. It is not uncommon for a zamíndár to keep his best cobs for seed. About six seers of seed is used per acre.

Treatment of the ground after sowing.

8. In báráni land two weedings are generally considered sufficient, but in well irrigated land at least three should be given, the first in the beginning of Sáwan (about 15th July), when the young plant is four or five inches above the ground, the second 15 days later, and the third in the beginning of Bhádon (about 15th August). If there is heavy rain in Bhádon it is necessary to weed the plant a fourth time in the beginning of Asoj (about 15th September). Wherever he sows his makki the zamíndár hopes to be able to raise it without irrigation, but if rain fails a watering is required every three weeks. The crop ripens in about 90 days, and if sown in Asárh (June—July) is cut in Asoj (September—October). In the Markanda alluvial tract the crop is sometimes in the ground by the end of Jeth (about 15th June) and off it by the end of Bhádon (about 15th September.)

Cutting and harvesting of crop.

9. When the crop has been cut it is stacked and left to dry for a period varying from a fortnight to six weeks. In the Markanda Bet, where the cultivators have a very large area to prepare for rabi cultivation, the stacks of makki remain untouched even for two or three months. When the grain has dried the cobs are cut off with the sickle, and the grain is threshed. If the crop is a small one the grain is beaten out with sticks (*godi ka ga*), if a large one it is trodden out in the usual way by bullocks. The cultivator does not use his bullocks for threshing makki, if he can help it, because the hard grain is apt to produce sores on their hoofs.

Watching of crop.

10. The crop is little liable to disease, but it has to be carefully guarded from the attacks of jackals and pigs, and when the grain is formed it has to be watched day and night to defend it from parrots and other birds. The watchman stands on a rude wooden platform called a "chundar" set up in the middle of the field, and frightens the birds by shouting and by discharging round earthen bullets from a sling. If there is not seasonable rain soon after the plant has germinated, the young sprouts are eaten by an insect called "phirka." After the cob has made its appearance the prevalence of light west winds is favorable to the filling of the grain.

Produce per acre.

11. Broadly speaking, maize in this tract is cultivated on three kinds of lands, (1) on manured well irrigated land, (2) on land which is flooded or constantly damp from vicinity of a stream or canal, (3) on dry lands.

In estimating the relative amounts of yield under each of these conditions, it is necessary to remember that, under the first the crop is secure, under the second partially so, while under the third complete failure is in a tract like Karnál-Umballa by no means uncommon. Irrigated manured crops not only yield heavier cobs than those grown on dry land, but in addition the individual plants often yield two and even three cobs, which rarely happens where the crop is dependent on the rains. Only a very rough estimate of produce can be given. I am inclined to think that the following figures would be fairly accurate :—

Irrigated and manured	560 seers per acre.
Flooded or naturally moist	360 " "
Dry	240 " "

The "irrigated and manured" estimate is a moderate one, and, of course, the best cultivators under favourable conditions get heavier crops out of the "gora" lands. The "dry" estimate looks low, but one must recollect the great risk there is of almost complete failure.

Time of ripening.

12. The cobs becomes fit for eating as a vegetable 15 days after the head (*súl*) appears. When so used the unripe cobs are roasted. Maize flour makes excellent "scones." I use the Scotch term because there is no real English equivalent for the native "roti." The zamíndárs of Jagádhri, Indri and Pipli live mainly on scones made of maize, jowár, mandwa, or barley and gram mixed. Mandwa makes inferior black bread, and is very heating. It is only used largely in a year of drought, and in the cold weather makki and jowár flour are chiefly used, the former being the favourite. In Kaithal, on the other hand, makki is scarcely used at all, except to the north of the Ghagar. The grain of makki is often parched, and in this form is a favourite food with women and children. The stalks provide very poor fodder and are little used, except in a year of drought. After the cobs have been separated from the stalks, the latter lie in the fields for the cattle to pick up, if they feel inclined, or they form one of the ingredients of the manure heap.

Manner of cultivating of crops.

13. The cultivation appears to me to be of a high order in the manured land. The zamíndár has nothing to learn from us as to the cultivation of the crop. Possibly better varieties could be introduced. But the mere fact that a variety yields more and heavier grain would not lead to its adoption. It must be hardy, so that the cultivator will not have to use his well much in the hot weather, and above all it must ripen as early as the varieties at present is cultivated. For it will do no good to the peasant to have a heavier crop of makki, if he has not time to prepare the land for his rabi crop of wheat or barley after he has cleared the maize off the ground.

No. 256—562, dated 18th March 1885.

From—R. Udny, Esquire, Deputy Commissioner, Kohát,

To—The Senior Secretary to Financial Commissioner, Punjab.

With reference to the Settlement Commissioner's Circular No. 561, dated 19th March 1884, I have the honor to submit the descriptive list of samples of maize grown in the district of Kohát duly filled in.

2. As desired in para. 3 of the above letter, three plots were sown for the purposes of experiment, *viz.* :—

Two at Kohát, near the Deputy Commissioner's house.

One at Hangu.

There is very little or no cultivation of maize in the Khattak Iláqa, and the statistics furnished are only for the Kohát and Hangu tahsíls.

3. Maize in the Kohát and Hangu tahsíls is nearly as important a crop as wheat. It is mostly grown on irrigated lands, except in the Upper Miranzai Tappa, where it is the principal kharíf crop on the rain lands as well.

4. There are two varieties of maize grown in the district, *viz.* :—

(1) Sarda which is generally of white color and used for earlier sowings.

(2) Garma, of yellowish color, and used for the later sowings.

Both these varieties are used for all purposes, *viz.*, as fodder for animals and for making bread; for the latter purpose the ripe grain of course is used and ground into flour. When ripe, the whole grain is also eaten after being dried and parched in a frying pan. When half ripe the cobs are roasted on the fire and eaten. Sarda is most in favor for making bread, while for parching Garma is preferred.

Another way of preparing the ripe grain is to dry it whole and parch it in a frying pan. In this form it is much used for eating early in the afternoon as a light luncheon.

On double crop lands, maize is usually preceded and followed by wheat or barley. The maize crop is harvested and all over by the middle of November. Land is then prepared for wheat or barley cultivation. Unirrigated lands are generally ploughed five or six times before being sown with wheat. In the case of irrigated land, the number of times it should be ploughed depends on the nature and quality of the soil, which is ploughed twice or oftener, and then sown. On the soft lands towards Kharmatu and Dhoda the land is ploughed only once before wheat sowing. On lands of the best quality overploughing does not pay as the crop grows too rank, and is more liable to be beaten down by wind and rain.

The wheat harvest is concluded from 10th to 25th May, and that of barley from 10th to 30th April. The land is then ploughed up for maize which is not sown till August.

When a field of wheat or barley has been cut early for green fodder, it is often advantageous to sow an intervening crop of melons, which is cleared off by the middle of July, and still allows the land a month's rest before the maize sowing commences.

The double crop lands of the villages in the Hangu tahsíl, dependent on the Toi water, are divided for every autumn harvest into three sections, *viz.* :—

(1) For cultivation of maize.
(2) ,, ,, of rice.
(3) ,, ,, of cotton.

and each section passes under all these crops in the following rotation.

To continue with maize this is followed by a barley crop which is over by the middle of April. Towards the end of April, or the beginning of May rice is cultivated (provided there is a plentiful supply of water in the Toi, and is harvested by the 20th of Bhádon (beginning of September).

The land is then prepared for wheat which is sown in the month of November and is followed by cotton, which is over by the end of Magar (first 15 days of December). The land is then left uncultivated for the rabi, and is manured in the month of Poh or Magh, so that it may regain its strength and the same rotation may commence again with maize cultivation in the coming kharíf.

In most parts of the district, single crop unmanured lands set apart for maize cultivation, bear maize crops autumn after autumn without change, remaining fallow, of course, in the spring, but on the unirrigated lands of Upper Miranzai, mung or bájra are made to alternate with maize.

The number of times the land is ploughed, after the rabi crop has been harvested, depends on the quality of the soil. Soft irrigated lands are ploughed two to four times, while the harder lands of the Matina description and unirrigated lands require five to six ploughings before being sown with maize.

When the ploughing has been finished the land is watered and four or five days later it is said to be "wattar," *i.e.*, ready for sowing. Land is never specially manured at the time of maize sowing. When land is manured at all, the manure is applied in December or January whether it is single or double crop.

When, however, an intervening crop of melon is grown, this has to be manured too, by application to the root of each melon plant separately.

As regards the seasons of sowing, Mr. Tucker writes as follows in his Settlement Report of the Kohát district :—

"The seasons for jowár* sowing are named after particular stars which then rise early in the morning.

* NOTE.—Maize which is called makki in the Punjab is called jowár in Kohát.

"These seasons are called 'wattars—'

I. The Paruni wattar (Pleiades) 22nd Jeth to 21st Hár.

II. The Trakkri or Taloi wattar, 21st Hár to 22nd Sáwan (locally known as Basakál)

The Trakkri or scales are the three stars forming the belt of Orion.

III. The Gup wattar (the Dog star.)

This wattar is divided into three parts.

(1)	The Put Gup, when the dog star though supposed to be above the horizon is not visible.	22nd to 26th Sáwan.
(2)	The Súr Gup, when the dog star is low down and red.	27th to end of Sáwan.
(3)	Spin or Chitta Gup, when the dog star shines out clear and white.	The first 22 days of Bhádon.

"The Gup is followed by Sahel (Canopus) when the sowing season comes to an end. To follow Mr. Tucker.

"Zamíndárs are often lazy about these dates and seasons. Still a knowledge of these 'wattars' is a convenience when inspecting crops. A zamíndár will tell you a particular crop of Put Gup sowing and another more backward of the Chitta Gup. In the Upper valleys Indian corn is sown earlier and ripens earlier than towards Kohát. The later a crop is sown the better, provided it has time to ripen. Towards the end of autumn the dew fall is excessive in places which are shut in by hills, and the Indian corn is destroyed by a disease called 'channi.' The more exposed places, the dew is dissipated by the wind. These latter can be sown later as the crop is not attacked by 'channi.'

"About Hangu Indian corn is generally sown from the middle of June to the end of July. Very little is sown after the beginning of August.

"In Kohát early crops are sown for fodder during the month of Hár (from middle of June to middle of July.) The regular sowings commence with the end of July and extend to the first days of September. The earlier sown crops generally give a poor yield. The grain does not seem to form, and large portions of the ear are bare with only a few seeds here and there; otherwise the crops appears perfectly healthy. On the other hand, the late sown crops often suffer for want of irrigation, unless there is timely rain at the end of September to fill the streams. In each village there are certain dates between which it pays the people to cultivate Indian corn. As we leave Hangu, the earlier sowing season gets later and later. Most villages divide the area to be sown between three or four different 'wattars,' though there is generally one favorite 'wattar,' for which most of the land is reserved. In Gari Mowaz Khan, close to Kohát, Chitta Gup is the favorite. In Dhoda, which is very confined, the Put Gup and the Súr Gup are the favorites.

"Above Muhamed Khoja the people do not cultivate later than the Put Gup."

Maize is sown broadcast like wheat. The seed is ploughed in and harrowing immediately follows. The plant appears above the ground in four or five days, and when it is about a foot high the field is watered for the first time. Then when the ground has half dried again, the zamíndár sets about clearing his field of weeds, but this duty is often neglected. In Upper Miranzai, instead of weeding, the field is ploughed through when the plant is about a foot high; the plough tracks being a foot apart, so that the soil should retain moisture for a longer time after the rains or irrigation.

This is locally termed "Chira." After this the zamíndár has very little to do beyond watering the field at proper intervals (generally every 15 days) and protecting it from the encroachments of animals, and when the cobs are formed, of thieves. Irrigation is most necessary when the ears are being formed, for otherwise the crop shrivels up, the grain gets thin and the yield is poor.

The number of times the land should be irrigated much depends on the quality of the soil.

In some places where the soil retains moisture for a longer time the crop ripens with two or three waterings, while in others it requires from six to eight irrigations.

The land selected at Kohát for the purposes of experiment was watered as follows :—

Sarda	... ...	3 times.
Garma	... ...	4 ,,

The cobs appear from the date of sowing in 45 days, and the grain is formed in the following 20 days after which the cobs become fit for eating. During this time till the stalks are cut and garnered, watchmen are appointed to watch the fields.

The Spin Gup "wattar" maize arrives at maturity in 90 days, but the earlier sown maize takes less time to ripen. The most trivial causes will affect the length of time for the crop to come to maturity, and the fact is well explained by the local proverb, *viz*:.—

"Ghwai pa khkar chi dana prewuzi ham faraq dai pa zarghanedu khe," *i.e.*, "If (in sowing) a grain should strike against the bullock (which drags the harrow) before it reaches the ground, even that makes a difference in the time of springing up."

The general idea in the district is that the Garma seed, though sown later, ripens together with the Sarda, but this has not been borne out by the experiment made, for it was found that the Sarda seed, which was sown 17 days earlier than the Garma ripened in 80 days against 88 for the latter.

Maize of the Trakkari "wattar" ripens by the beginning of October. The Spin Gup crop ripens about the end of November. The stalks after being cut are left in the field in sheaves to dry for a few days, and then taken home or to the threshing floor where the cobs are separated from the stalks. About one-twentieth of the cobs is paid as wages to the laborers hired for this work, for which women are generally employed. The cobs are then exposed to the sun for about 20 days to dry, after which, they are beaten with sticks to separate the corn. In some villages of Miranzai the corn is separated by bullocks treading out the cobs as in the case of wheat.

The statement annexed shows the yield per acre.

The yield per acre of crop sown for experiment was as follows:—

			Mds.	Sers.	Chs.	
Kohát ...	Sarda	... ...	34	11	7	per acre.
	Garma	... ...	24	34	0	,,
Hangu ...	Sarda	... ...	18	...	...	,,

The grain is nearly all consumed in the district. Any small surplus there may be is exported to Tirah (Independent Territory.)

The stalks (*tante*) are used as cattle fodder and there is no export.

The following are the blights and diseases to which the maize is liable:—

1. *Channi*, "Dew-fall." Towards the end of autumn the dew-fall in places shut in by hills is excessive, and the crop when attacked by it is completely destroyed. In such places, therefore, even at the risk of obtaining a poor crop, maize is sown earlier than elsewhere, so as to be harvested before the dew-fall comes on.

2. *Chinji* or the "worm." Is a white insect from half to three-quarters of an inch in length. When there is a deficiency of rainfall, it attacks the early sown maize near Kohát at the root on which the plant withers away soon after.

3. *Spinki*.—This disease is common to both the tahsíls (Kohát and Hangu) and generally attacks the crop when the cobs are being formed. The stalks thereupon shrivel up and become white or yellowish, and little or no grain is formed on the cob.

Tilli.—This disease is peculiar to the Hangu tahsíl. It attacks the crop during the rains between the 17th Hár and 1st of Sáwan, when the plants are young, and is popularly supposed to be due to the heat engendered in rainwater, which has passed over waste and barren lands.

No cure is known for any of the above diseases.

I annex a statement giving all the particulars regarding the land cultivated with maize for purposes of experiment. I also send ten sample cobs of each variety of maize in the district.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Name of tahsil.	Name of village.	Variety of maize.	No. of ploughings anterior to sowing.	Date on which watered previous to sowing.	Date on which manured.	Area cultivated.	Quantity of seed.	Date of sowing.	Date of shooting out of plant.	Dates on which crop was irrigated.	Date of forming of cobs.	Date on which crop was cut.	Height of stalks.	Total yield in English maunds.	Yield per acre.	General Remarks.
Kohát	Muhammad Jona.	Sarda	After the wheat crop was cut, the land was ploughed over twice and made shama.	28th July.	During the month of Mágh.	K. M. 1 15	5 seers ...	19th Sáwan Sambat 1941=1st August 1884	6th August 1884.	23rd August 1884. 8th September 1884. 28th September 1884.	15th September 1884.	19th October 1884.	8 feet maximum, Minimum 4½ feet.	7-20-0	34-11-7	The ears were small owing to thick cultivation of crop. Most of the stalks had only one ear.
Ditto	Do.	Garma	Do.	13th August.	Do.	K. M. 1 8	4 seers ...	4th Bhádon (17th August 1884).	21st August 1884.	30th August 18th September 1884. 8th October.	11th October 1884.	12th November 1884.	Maximum 7 feet, Minimum 4 feet.	4-14-0	24-34-0	
Hangu	Hangu	Spin	The land was ploughed from 5 to 7 times.	4th June 1884.	Mágh or Phágan last.	2-2-19.	Md. S. 1 32	8th June 1884 =28th Jeth 1941.	16th June 1884	Only once. 28th August 1884 on account of sufficient rains.	10th August 1884. = 1st of Bhádon.	10th September 1884.	9 feet.	43 Mds.	18 Mds.	Wheat has now been sown after cutting this jowár crop.

DEPUTY COMMISSIONER'S OFFICE.
KOHAT,
The 18th March 1885.

R. UDNY,

Deputy Commissioner, Kohát.

No. 455, dated Ludhiána, the 6th April 1885.

From—G. E. WAKEFIELD, Esquire, Deputy Commissioner, Ludhiána,

To—The Senior Secretary to Financial Commissioner, Punjab.

IN compliance with Settlement Commissioner's No. 561, dated 19th March last, I have the honor to submit a report regarding the cultivation of maize in this district arranged according to the heads specified in the Circular.

Varieties grown—yellow, red and white. Yellow the prevailing, almost sole, variety grown.

(i). Three varieties of maize are grown in this district, *viz.*, yellow, white and red; yellow is most commonly sown almost in all parts of the district, and this species is generally preferred to all other kinds. The grain is not sown in this district for any other purpose than for bread, roasting and parching. The seeds are larger in size than other species grown in the district, and the flour has more of mucilage in it than that of any other kind.

White.

The white is comparatively rare and is sometimes sown to ensure an early crop as it appears to come up earlier in the season than the yellow variety. The red is never sown separately, but appears to get mixed up with other sorts, and the ears seem to be looked on as deteriorated specimens. In fact if red seed were enquired for in the bazár, it would not be forthcoming as it is not kept for seed.

(ii). Taking the year to commence from the month of April, after the rabi crop has been harvested the land is left uncultivated till the rains commence in July, when it is ploughed three or four times up to the commencement of August. Maize is then sown and reaped in October. In the month of September, while the crop is standing, ajwán (aniseed), metha and carrots are sometimes sown in the open space between the rows of maize which is harvested in the month of April, the maize having been reaped in October. In some places after the maize has been reaped wheat is sown in November, which is reaped in April.

In certain irrigated lands adjoining larger towns, maize is sown in April, and cobs are ready for use by the end of June. The cobs while green are roasted and eaten by the people as a delicacy.

(iii). The land in which maize is grown is ploughed three or four times before sowing. If the rains are late the land is watered by artificial irrigation and the seed is sown. No manure is used before sowing.

(iv). Sowing is commenced in August in low lands (Bet) during the first week, and in uplands (Dhaya) in the second. After the seed has been sown the field is hedged, and if there is no rain when the seed has commenced to germinate the crop is irrigated once a week and manured 15 or 16 days after the sprouting has commenced. The quantity of manure ordinarily used is at the rate of 100 maunds per acre. When the crop has grown to a certain height, hoeing is commenced which is repeated at an interval of 10 or 12 days till the crop is ripe, which takes about 60 or 70 days from sowing.

(v). The crop is ripe by the middle of October, when it is reaped and allowed to lie in the fields for a day or two, the stalks are then collected and put together to dry for 30 or 40 days in a fenced enclosure in the field. The cobs are broken from the stalks, and the grain is separated from the cobs by beating them with sticks somewhat in the English method of threshing.

(vi). Estimated yield per acre in this district is as follows :—

	Irrigated.		*Unirrigated.*	
	Manured.	*Unmanured.*	*Manured.*	*Unmanured.*
	Mds.	Mds.	Mds.	Mds.
Dhaya (uplands)...	20	12	...	11
Bet (low lands)	13	12	8	6

(vii). The grain is used as food for man, stalks as fodder for cattle, and cobs, when stripped of seeds, are used as fuel. The stalks are split in two and broken a little, but not chopped when given to cattle.

(viii). During the month of September a blast of strong wind called "Aghat" sometimes blows from the north and breaks down the stalks, and

injures the crop by the mere force of blowing. According to Hindú calculation this wind is apt to blow from 13th to 22nd Bhádon ranging between the last week of August to first week or ten days of September.

When the crop is ripening, damage is sometimes done by a sort of "smut" called "sundi," which destroys the stalks, the "smut" of English nomenclature.

In the Bet lands crops are sometimes destroyed by the overflowing of the river.

In the uplands (Dhaya) if water accumulates in the field during the day from a heavy rain, and does not flow out or dry up before night, and the night happens to be a moonlight night, the crop is seriously injured and is called *Chándni már* (destroyed by moonlight).

No other diseases or blights are known in this district.

(ix). The requirements for this crop are sufficient ploughing, manuring, watering and hoeing. The watering has to be given once a week.

2. I am informed that very fine maize crops have been grown this year in the Ferozepore district in land watered by the canal, and I have little doubt that soon the same process will commence in this district.

3. I have made very careful enquiry and find that there is no sufficient variety in the cultivating process to justify any distinction as to degree of skill and science. The process appears to be very uniform.

4. The manuring for the crop is so heavy, and the after process of enrichment of the soil by the residue of leaves and stalks so good that it is quite a rule to sow wheat after this crop the same year. During October to November this crop is cut, and the wheat crop is put in and irrigated and a good crop is generally obtained without further manuring, though, of course, irrigation has to be supplied; and this process will go on for years.

5. Specimens of each sort are herewith forwarded.

No. 723, dated 28th May 1885.

From—J. A. E. Miller, Esquire, District Judge, Kángra,

To—The Director of Settlements and Revenue Records, Punjab, Lahore.

In compliance with Colonel Wace's Circular No. 561, of 16th March 1884, enquiries were made in this district with regard to maize cultivation, and I have the honor to forward a statement compiled from the reports of Tahsíldárs, in the form attached to that circular.

The samples therein referred to will be sent to you separately. I enclose also a very complete and interesting report by Mr. L. Dane, former Assistant Commissioner of Kulu, giving an account of the cultivation in that sub-division, which is applicable also in the many ways to the system in the higher parts of the rest of this district.

I regret that the subject has been so much delayed in my hands, owing to press of other work; but though late, these papers may still be of some use.

Maize is a favorite crop in these hills, and its cultivation is well understood. It is grown almost entirely on báráni lands, and in most cases manure is used.

In the case of the Hamírpur tahsíl the area is shown as chiefly unmanured, and I am not sure that this statement can be correct, more especially, as the average outturn is placed as high as 11 maunds per acre. But possibly the crop is not freshly manured every time, but is dependent on manure already in the ground used for other crops.

Maize usually follows a wheat or barley crop where the land is good enough to produce two crops a year.

It is sown shortly before the rains, and is reaped in September.

The grain is used chiefly as food for human beings, especially during the cold weather. It is sometimes eaten roasted or parched, but more generally in the form of cakes, or chappatís.

The chief objection to it is, that it does not keep long, being very liable to attack by insects.

The stalks when not too dry form good fodder for cattle and are used as such.

Maize in this district is a valuable counterpoise to rice. The latter requires laborious cultivation and is not a strength-giving food, while the former is hardy, easy to cultivate, and highly nutritious. It occupies the place that jowár and bájra do in the plains.

Experiments have been made with various kinds of American maize, and there is no doubt that these varieties can be successfully grown here, but they are not much appreciated by the people. They prefer their own kinds, as being *sweeter* to the taste. I had some cakes made at the Jail out of several varieties of American maize grown in the district. They seemed to me very palatable, but the natives did not care for them. To the European taste sweetness in bread or in cakes to be eaten with butter or vegetables and meat, is usually considered a disadvantage, but the native taste seems to be the other way.

Another objection to the American maize is, that the stalks grow too thin to hold up the heavy cobs, and are liable to be blown down by wind. Mr. Dane points out that the American maize remains too long on the ground and prevents or delays the sowing of a rabi crop, but I doubt if this objection applies to the warmer parts of the district.

Some years ago an experiment was tried with Cuzco maize, a specially fine variety grown in Mexico. It did not succeed well, owing to late sowing and want of care, and probably because it was grown at too high an elevation. I see no reason why it should not succeed, if planted at the right time and the right place in this Valley.

I think with regard to all these foreign varieties that though they are not much appreciated by the natives of the district, who are somewhat prejudiced in favor of old customs, they might be valuable for export some day, when the communications of the district are in a better state; that is, when the railways penetrate further into the interior, and roads in all directions are improved.

I see it is stated in Messrs. Duthie and Fuller's "Field and Garden Crops of the North West-Provinces" that—

"Maize is undoubtedly an introduction from America, and its cultivation is of recent date compared with that of the other cereal crops."

This may possibly account for the success obtained with American varieties in the Punjab, and especially in this district, where probably the very best varieties will succeed better than in hotter districts. And I imagine that these fine American varieties will, with proper skill, make finer meal and flour than the ordinary kinds.

At present "corn flour" is made in England from Indian corn imported from India and America, and it is then re-exported to this country in tins. There is no reason why the process should not be carried out in this country with the requisite machinery and skilled supervision. Indian corn flour made in India would find a market not only among Europeans, but among natives, especially of the high class, for the finer kinds of pastry and confectionery.

I think, therefore, that our efforts for the cultivation of superior varieties of maize in selected tracts ought not to be relaxed, and that in due time they will be better rewarded than at present.

As to the use of maize stalks for fodder for cattle, there is a difficulty in the fact that if the crop is allowed to stand till the cobs are fully ripe, the stalks and leaves are too dry to be of much value as fodder. While on the other hand the cobs are too valuable to be sacrified at an earlier stage of the fodder. This difficulty forced itself on my notice last autumn, when I was considering the practicability of preserving some maize stalks in a silo. By the time the stalks were available they were too dry for ensilage, and the only plan would have been

to cut them down before the cobs were quite ripe. It might be possible be strip off the leaves while still green, and utilize them as fodder or for ensilage, but this would be rather a laborious process, and the loss of the sweet and succulent stalks would be a great disadvantage.

I may note here that the maize cultivation of this district must be very largely on the increase as the average of 5 years 1872-73 to 1876-77 given in the Famine Commission Report (page 107) is only 62,142 acres, whereas the present area is 117,206 acres. The area fluctuates greatly according to the rainfall, and the 5 years average above given probably includes one or two bad years, whereas the season of 1884 was a very good one.

At all events the statistics of maize cultivation show that it is most extensive in the hilly and sub-montane districts; among which Kángra takes a prominent place, and anything that can be done to improve and extend it in this district will be most beneficial, especially if it causes a decrease of rice cultivation which is, in the opinion of many, *not* an unmixed blessing.

No. 112, dated Camp Nai, the 25th August 1886.

From—Louis W. Dane, Esquire, Assistant Commissioner, Kullu,

To—Colonel C. N. Jenkins, Deputy Commissioner, Kángra.

I have the honor to submit a report on the maize cultivation in this sub-division as requested in your No. 724 of 19th May last.

The crop is not sown in Spiti or Lahul, but this year a few cobs of Indian corn were given by me to some Lahulis, and when I was at Kailang I saw the plants which appeared to be doing well.

In Kullu there are three indigenous varieties of the grain known—

(1). Sathu, so called because it ripens in 60 (sáth) days.

(2). Tandara, so called because of the length of the stalk and cobs.

(3). Rohru, an inferior variety so called on account of its small size.

The sathu is the more generally preferred as it can be grown as a second crop. The tandara gives the finest crop, but as it takes up the ground for nearly six months and so prevents a spring crop being grown it is not much thought of.

The Rohru is an inferior variety altogether, and is only grown on poor lands or by indolent cultivators who have not prepared their land in time to allow of the cultivation of one of the other two kinds.

These varieties are used promiscuously as vegetables and for food grain and bread. In Seoraj the tandara is known as *ninli cheli,* and the sathu as *desi cheli* or sathu. Rohru is used as a general term, but is not the common name for the crop as the Naib-Tahsíldár supposes.

2. The year's course is as follows when sathu is sown. Rabi harvest, barley or wheat, opium or sirson. Kharíf, sathu. Rabi, &c., barley or wheat, opium or sirson. When tandara is sown there is only one crop during the year.

3. Good cultivation consists in first ploughing and rolling. Then sowing (which is here broadcast), followed by a second ploughing and rolling. In the case of sathu where speed in getting the crop in is essential, the stubble of the preceding crop is ploughed in, the longer stalks removed and the seed sown and rolled. Sometimes a second ploughing and rolling follows.

The crop is invariably sown on unirrigated land, and is commoner in the *bal* or low-lying fields than in the *gahr* or uplands. In fact, in the high uplands it is not grown at all.

In the case of sathu there is no anterior manuring. The crop has to do on the manure left in the soil from the manuring for the previous rabi crop. If this has been opium or sirson the Indian corn is finer, as the land has to be more carefully manured for these crops than for wheat or barley. For tandara the land is manured with a mixture of *suhr* (pine leaves) and dung in Jeth, just before the crop is grown.

Maize is hardly ever grown on altogether unmanured land. If it is the result is generally, except on the finest soils, a crop of rorhu.

4. Sathu is sown from 15th Hár to 1st Sáwan; tandara from 15th Jeth to 10th Hár and even in Baisákh. Rorhu as with sathu.

After sowing, the field is left till the stalk is about one foot high when it is weeded. This in Seoraj is done with the hand and *kodáli*. In Kullu it is often done by ploughing through the crop, which has also the effect of opening up the soil and thinning the crop. A second weeding takes place when the corn is about three feet high, before the flower comes on; when the crop is in flower, it is considered bad to go into the field, possibly to prevent the chance of the flowers being rendered unfertile by the pollen having been brushed off, Sirson, múng, kadus and kakris are often sown amongst the corn to be used as vegetables.

5. The cobs ripen according to the locality from the end of Bhádon to the beginning of Kartik, but about the 15th Asoj, may be taken as the usual date for gathering the harvest. There are sometimes, and more especially in the case of tandara which is better manured, two and even three cobs on each stalk.

The cobs are placed in kiltas and taken home. There the outer leaves are taken off, and the cobs placed to dry in the sun on the roof. There they are left some 20 days, and eventually at the end of Kartik in Mangsir, the grain is separated from the cobs by beating them with sticks. The cob is burnt. The grain sells at about one maund to the rupee.

6. The usual measurement in Kullu is by *bhars and paths*, 16 *paths* go to the *bhar*. The measures are measures of capacity, but a *bhar* of maize is equal to about 20 seers pakka; 3 *bhars*, 3 *paths* of seed barley go to the acre. In the case of maize the amount of seed is less. Of sathu some 13 *paths* and of tandara some 10 *paths* are sown in an acre of land. The produce varies greatly from place to place and from year to year. The Tahsíldár of Kullu puts an average crop at 11 maunds 20 seers, and the Náib-Tahsíldár of Plách at 18 maunds. Thákur Dás gives an average crop in the upper Valley at from 15 to 16 maunds and the same results have apparently been obtained by Mr. Theodore at Dhobi. Taking 15 maunds as the average crop the return is some thing more than fifty-two fold on the seed outlay which seems a good result.

7. The cobs are roasted when green, but are supposed to produce indigestion unless butter milk be drunk with them. The grain is parched like gram and is also made into meal and bread. A zamíndár will eat about two seers of maize *áta* a day, and a non-labourer about 1 seer a day, but it is not a favorite food, as it produces flatulence and indigestion.

The grain is not fed to cattle, but the young plants taken out in the hoeing and thinning, the outside leaves of the cobs, and three-fourths to one-half of the stalk after the cobs have been picked, are all used as fodder, and are highly valued for this purpose. A good deal of maize is exported to Seoraj from Kullu, but not to Lahoul or Ladakh, where it is not much thought of. The grain is recommended by the local hakíms as tending to improve the memory, but the extensive use of it does not appear to have had much effect on the population of Kullu as yet.

8. The crop is liable to mildew known as *buka*, if rain does not fall soon after the sowing, and to an other disease called *arni*.

The cause of this is not well ascertained, but when a field is attacked the cobs come to nothing and no grain forms. It is attributed by the people to a blast of air, whether hot or cold, I have been unable to find out from them.

Bears, monkeys and porcupines are excessively fond of the cobs, and consequently, the fields require to be carefully watched. For this purpose raised *machans*, known as *tapris* are erected, and men are stationed there day and night, but even so a great deal of damage is caused in this way.

9. The Kullu peasant is not an industrious cultivator, and I really do not see what we can do to improve the maize crop. One thing he fully understands is the use of manure, and as plenty of this, owing to the propinquity

of forests is available throughout the valley, the fields are, as a rule, well fertilized, and to this is due the excellent return obtained. The system of sowing broadcast is wasteful, as is also the method of weeding by ploughing, and if these two practices were discontinued a still larger return on the seed sown might be obtained. But this would involve a considerable amount of labor which I fancy the Kullu zamíndár would not be willing to give.

As regards American maize you are, doubtless, aware that Mr. Carleton has, for years past, been endeavouring to extend the use of this throughout the valley, and kindly sends me a certain amount for distribution every year. I also enclose a report by Mr. Theodore, who has given the subject a great deal of attention and carefully conducted experiments thereon. The zamíndárs object to the American corn for the same reasons as they do to the tandara. It takes up the ground so long that they cannot plant a spring crop. In this respect, it is even worse than the tandara. It ripens so late that a great deal of watching is required to prevent the whole crop being carried off by bears, &c. It has not such a pleasant flavour as the Kullu corn.

The method of planting three seeds to each maund involves a great deal of extra labour.

Mr. Theodore's experiments go to show that the seed, if sown in one locality for several years in succession, soon deteriorates, and the outturn is even less than that from Kullu seed. Moreover, although the individual cobs are huge and impress one greatly, a far larger number of plants of the Kullu variety can be grown on the same amount of land, and consequently there is not so great a difference in the outturn of seed as might have been expected from a comparison of the cobs.

I have distributed the seed regularly and grown samples of it at Naggar, where it does wonderfully well. I have now cobs measuring 18 inches in length with 16 tiers on each. The seed was sown in Baisákh. This year I have made the recipients of the seed promise to give me full particulars of the method of cultivation and the outturn, and will send in a report to you when the crop ripens, along with samples of the different varieties. The forms furnished by the Tahsíldárs are sent in herewith as you appear to require statistics urgently. A carefully filled in form will be sent in with the samples.

The Tahsíldárs' reports are not worth much, but you will, doubtless, peruse with interest Mr. Theodore's memorandum and one by Thákur Dás, of Naggar, which are forwarded herewith.

Indian Corn.

For about the last ten years I have grown American Indian corn from seeds obtained in Calcutta (Landseer's). First I commenced with a few packets and from that produce collected the seeds.

In 1876 we had sown 5 *path* of that seed (one *path* about $1\frac{1}{2}$ seer), on 2 *bhar* 2 *path* of land, and obtained the great produce of 45 *bhar* or 144-fold.

In 1877 we did sow 5 *bhar* of seed, the best selected from the produce of last year, and the produce was 360 *bhar*.

In 1878 we had sown 5 *bhar* 6 *path*, the produce was 240 *bhars*.

It can now be seen that the produce gets from year to year less, although the best seeds were selected, and cultivation had been carried on carefully and just as formerly.

I am of opinion that imported European seeds deteriorate, however strange it may appear; to me it appears so and not only with American Indian corn, but also with other imported seeds. From commencement the produce rises for some years, but hereafter it becomes less almost equal to the country seeds.

Those seeds were sown, and the land cultivated by my own labourers.

Sometimes the produce might have been more, but the bears and porcupines destroy a good deal, often in one year more than in other year; and they are rather more fond of the American corn than the Kullu corn.

Indian corn is rather a precarious crop; some years the harvest is very good—I believe in the lower part of the valley the produce is much better than higher up. My main land is about 4,700 to 5,000 feet above sea level.

The American Indian corn, which I had sown, takes rather a longer time to ripen, and so requires more watching.

Indian Corn grown at Dhobi, Kullu.

Year.	*Seed.*		*Produce.*		*Area under crop.*	
	Bhar.	Path.	Bhar.	Path.	Bhar.	Path.
1876.						
American	...	5	45	...	2	2
Kullu	...	...	...	...	...	...
1877.						
American	5	...	360	...	20	...
Kullu		... ...	...	...	...	...
1878.						
American	5	...	240	...	20	..
Kullu	...	...	...	...	...	...
1879.						
American	5	6	152	...	21	...
Kullu	1	12	30	...	...	...
1880.						
American	3	...	120	...	12	...
Kullu	2	10	167	10	11	...
1881.						
American	2	...	39	6	8	...
Kullu	3	...	130	...	12	...
1882.						
American	1	2	64	...	4	8
Kullu	3	...	130	...	12	..
1883.						
American	...	7	Papers	not	here	
German	1	...	Papers	not	here	
Kullu	2	2	82	...	9	....

The natives do not care much to cultivate it, they grow perhaps a little near their houses often merely for raw eating; but as a regular field crop, they have seldom or never done so in my villages.

I have about 60 tenants who hold lands on half produce, but no one has ever asked me to grow the white American Indian corn. I had, years ago, given to many people some of the American corn seeds but they have not continued to grow it as a field crop.

Often a fair and good crop is obtained from Kullu seeds, and I manage always to get a better produce from that sown by my own labourers than I receive from my tenants, although my labourers are the same people, and many the sons of my tenants, and we cultivate only in a ordinary way.

No. 75, dated Umballa, 6th June 1885.

From—T. J. Kennedy, Esquire, Officiating Settlement Officer, North Umballa Settlement, Umballa.

To—Captain J. A. L. Montgomery, Director of Settlements and Revenue Records, Punjab.

I have the honor to submit the following report on the cultivation of maize in the tract under this settlement.

2. There are two varieties. A white variety with large cobs, and a yellow variety with smaller cobs grown. The yellow variety gives bread of better flavor; but the white variety, when parched, swell out to a larger size, and is said to be better suited to old, toothless people. There is more gluten (*les*) in the yellow variety, which renders it more palatable, and being richer in nitrogenous flesh-forming compounds, it is probably more nutritious

than the white variety, and is certainly more largely grown. There is no difference in the price, and the two varieties are sown together, as well as separately.

3. *System of husbandry.*—Maize is sown after a rabi crop, or after a fallow. It is not generally sown after wheat which is considered an exhausting crop, and if it is sown, the field must be manured well; but it is frequently sown after gram. This is the usual course on well land. On "báráni" land, it is customary to give the land a fallow after cotton, and then manure and sow maize. In this district it is always grown on good land, very frequently on the "goradeh." The field from which gram or wheat has been cut, is ploughed up once lengthwise and once breadthwise (*parawdusar*), (in Visákh if maize is to be sown) and the ploughed surface is left exposed to the sun during Jeth, and manure is carted out and laid in little heaps upon it. The best manure is reserved for sugar-cane; the top of the heaps which has not been so thoroughly decomposed is good enough for maize. As soon as the first rainfalls (in Hár in a normal season) ploughing for maize sowing begins. The field is ploughed once par, then dusar, then a second time par, and afterwards the clod crusher is driven over it. The seed is then sown in Hár or Sáwan. On irrigated *(singári)* land, it is usual to sow by dropping the seed in the furrows made by the plough; on unirrigated land it is usual to sow it broadcast. After sowing the clod crusher is again driven over the field to level the surface, and it is divided by little banks (*dol*) into a series of compartments (*kiyari*), in order to prevent drainage water flowing off to a lower level. There is no regularity in the size of these compartments; they vary in size according to the uneven or level character of the ground. When Sáwan comes, the maize which grows rapidly and is then about six inches high, is weeded with the hand hoe; and afterwards in Bhádon, if the crop is sown on báráni land, the plough is driven between the rows to eradicate weeds and bank up the earth around the plant; if on well land, it is again weeded. After that it is left to ripen. It should not be cut till it is well ripe. "Dhán sadudhli, makki lál, aise aise úrd jowár, masri kírahe koí koí phul, channa tharakte, gehún gat túl." Cut rice when there is some sap in the grain, maize when it is reddened (*i.e.*, fully ripe), and so cut úrd and great millet. Let some flowers remain on "masri" when you cut it, cut gram when the grain is rattling in the pod, and wheat when the ears are hanging down.

It will usually be fully ripe in Asoj and ready for cutting. The plants are cut at the roots with the ordinary sickle, allowed to remain for a day and night on the ground to dry, and then tied up into sheaves (*bári*). The leaves are not lopped off as is done with sugar-cane. The sheaves are taken to the threshing floor (*khalwárah*) and are usually piled on the outside of it, so as to form a kind of screen around it, which is encircled on the outside by bundles of "panni" grass, so as to protect the maize for the ravages of cattle. The maize is allowed to lie there from Asoj to Kartak (from a fortnight to a month altogether) and then the women of the agriculturists begin to pluck off the cobs. The best cobs are thrown aside and are taken home, and stored for seed and they are only threshed out a day or two before the seed is required for a next harvest's sowing. The ordinary cobs are piled in heaps of five or six maunds at a time on the threshing floor, and the grain is beaten out with sticks. On rare occasions is the seed threshed out by the trampling of oxen, the reason being, that by this method the feet of the oxen are injured and the grain dirtied after the first beating out the cobs are sorted from the heap, those to which any grains still adhere are placed aside, and subjected to a second beating, and if after this any grain is still left on the cobs it is picked off with the hands. The grain is then cleaned by allowing it to fall from the "chaj," spread out on clothes to dry and taken home and stored in mud granaries (*koti*) where it keeps best, or in huge baskets (*pechri*) made of wicker work *(málá* or *ghan)* plastered over with mud and cowdung; but rats do a good deal of mischief to grain stored in this way. It is never stored in pits in the ground (*khati*). The cobs stripped off the grain are collected and burnt for charcoal which is given to the village blacksmith. Maize is not an exhausting crop. It is frequently followed by a Hári crop on irrigated land; but hardly ever is this the case on unirrigated land; such land is usually left a year fallow and then sown with wheat.

Maize is sown both as a mixed and as a separate crop, perhaps, more generally as the former. The usual crops with which it is sown are úrd or

mara; the former ripens after maize and a field thus sown cannot bear a crop, the following harvest as "úrd" ripens too late to allow ploughing for the Hari. "Mara" ripens before or at the same time with maize; very frequently a border of til is placed around a maize field.

4. *Estimated yield per acre.*—The zamíndárs say that a good crop of maize yields from 10 to 15 maunds of 17 seers each, a katcha bigáh zamíndári, or in other words, from 1,150 seers to 1,800 seers an acre on irrigated land, and from 5 to 8 maunds, or about half that, on unirrigated land. The results of the crop experiments conducted for the purposes of the settlement show the average outturn to be 611 seers per acre on irrigated land, and 475 per acre on unirrigated land; but last year's crop was an exceptionally poor one. The amount of seed sown is, I learn, after careful enquiry, to be 6 seers on the average or a little more. This corresponds with the figures for the North-Western Provinces.

5. *Consumption of the grain.*—The grain is either parched unground, or simply ground without being parched and made into bread. It is considered a warm food, and is usually eaten in the winter season, with pottage or sirson or gram. It is usually grown, at any rate in this district, for home consumption and not for sale. The stalks (*karab*) are not thought much of as a fodder, when green, cattle eat of the leaves and the refuse is thrown on the dung hill.

Maize is also plucked to be eaten as a vegetable in Asoj about twenty days before it is considered fit for cutting.

6. *Blight and other diseases of the crop.*—Maize is a crop which succeeds best with a moderate amount of rain or sunshine. "Main guhla pardian karáni, na bahuta khaún dhup, na bahuta khaún pani." "I am the queen of plants whose cobs are enclosed in a sheath (provided that) I do not get too much sun or too much water," is a proverb applied to maize. Excessive rain in Sáwan or Bhádon drowns the plants, and it shrivels up if it does not obtain a due supply of water; but when it has attained a height of several feet towards the beginning of Bhádon the crop is assured, unless, as was the case last year, there is unseasonable rainfall towards the end of Asoj and beginning of Katak, when the maize stalks piled in the field sprout, turn black, rot, and are useless except for manure. Maize suffers very little from disease. It is, however, subject to the attacks of animals—parrots, jackals, crows and dogs being especially fond of it. To protect it from depredation, stages are erected in maize fields, or trees are stripped of the leaves and platform made among their branches, and boys and men stand on them and with slings hurl pellets of mud or crack thongs of leather to frighten off birds and animals.

No. 561, dated Lahore, the 19th March 1884.

From—Lieutenant-Colonel E. G. Wace, Cammissioner of Settlements and Agr., Punjab,

To—All Deputy Commissioners and Settlement Officers, Punjab.

The Financial Commissioner has directed me to pursue the inquiries in respect of the maize crop of the Province which were initiated three or four years ago by the attempt to introduce improved varieties of American maize.

2. It appears to be a necessary preliminary to any effective measures for introducing better varieties, that some detailed information should be obtained in respect of the existing cultivation of this crop. It is believed to vary from very rough and poor cultivation on unirrigated land, to crops of great weight and richness produced with the richest husbandry.

3. I therefore ask the favor of your arranging to supply me, by the end of the coming hot weather, with a tersely written account of the husbandry of this crop as practised in your district. I leave it to you to decide whether you will furnish this account yourself, or ask one of the officers of the district to undertake it. All I plead for is, that whoever undertakes to furnish it shall write from personal inquiry and after a careful examination of the crop and its husbandry.

4. I would deprecate too ready depreciation of the current husbandry of the crop. No doubt it is capable of improvement; in some places to a great extent, everywhere in some degree. But for practical purposes agriculture is good or bad, according as it is well or ill adapted to the means at the cultivator's command or which we can place at his command.

5. And constituted as Indian agricultural society is, every inquiry of this nature must, I think, necessarily fall into two main divisions—

1st.—The extent to which the practices of the small body of first-class cultivators are capable of improvement; and

2nd.—A consideration of the methods by which the mass of the cultivation can be raised so as to approach the level already attained by the husbandry of the more skilful cultivators.

6. I subjoin a memorandum suggesting main heads of inquiry; and it will be convenient if the report can be framed mainly on the lines thus suggested. Samples of the cobs of each variety should be sent to my office, say 10 cobs of each variety (5 good and 5 average); and a descriptive table of each variety should be given in the form herewith enclosed. It is of importance that head 3 of this table should be filled up. Exact areas are not required.

Main heads of inquiry in respect of the cultivation of Maize.

1. Varieties grown; and the circumstances under which each is preferred. [In America, there are distinct varieties grown for consumption as a vegetable, for roasting, and for bread.]

2. System of husbandry of the land on which sown; describe the whole year's course, so as to show what crops precede and follow.

3. Ploughing, irrigation and manuring anterior to sowing.

4. Date of sowing; treatment of the field between sowing and harvesting.

5. Date of ripening of the cobs, and subsequent treatment thereof, up to the separation of the grain from the cob.

6. Estimated yield per acre.

7. Consumption of the grain and stalks.

8. Blights and other diseases of the crop.

9. General remarks and suggestions.

Descriptive List of Samples of Maize grown in the District.

1	2	3						4	5	6	7	8			9	10	11	12	13
Number of samples.	Local name.	ROUGH ESTIMATE OF AREA ANNUALLY SOWN BY EACH KIND.						Color of grain—white, yellow or red,	Description of soil on which each variety is usually sown and for which it is most suited.	Whether requiring careful cultivation and irrigation or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	*Estimated yield of grain per acre stated in seers of 80 tolas.*			Ordinary price, seers per rupee.	Are the stalks fed to cattle.	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Irrigated.		Moist flooded lands.	*Dependent on rain.*		Total.												
		Manrred.	Unmanured.		Manured.	Unmanured.						Maximum.	Minimum.	Average.					

B.—*Statement showing leading statistics regarding Maize cultivation in the Punjab.*

	1	2	3	4	5	6	7
	District.	Area under Maize in acres. According to maize report.	According to returns for 1884-85	According to returns for 1885-86	Average of Cols. 3 & 4.	Percentage of area under maize (Col. 5) to total cultivated area.	Average rainfall for 4 months (1st June to 30th September.)
1	Hissar	126	83	99	91	0	12
2	Rohtak *	157	157	139	148	0	16
3	Gurgaon	2,277	2,814	1,491	2,153	0	23
4	Delhi	22,010	12,623	7,853	1,0238	2	23
5	Karnál	19,221	18,904	16,584	17,744	2	23
6	Umballa	122,452	130,454	112,032	121,243	12	28
7	Simla	1,481	1,667	1,631	1,649	16	52
8	Kángra	117,206	139,903	134,473	137,188	29	55
9	Hoshiárpur	128,272	132,684	138,890	135,787	19	27
10	Jullundur	85,500	76,527	76,239	76,383	11	22
11	Ludhiána	54,502	53,454	50,515	51,985	7	23
12	Ferozepore*...	25,738	25,738	31,690	28,714	2	17
13	Mooltan *	256	256	485	371	0	5
14	Jhang	6,052	3,124	4,741	3,933	1	8
15	Montgomery	2,057	2,057	2,284	2,170	0	8
16	Lahore *	36,832	36,832	35,337	36,085	3	16
17	Amritsar	49,468	3,9502	32,716	36,109	5	20
18	Gurdáspur	43,537	52,446	55,538	53,992	6	24
19	Siálkot	65,908	67,687	66,775	67,231	7	27
20	Gujrát	13,301	18,983	23,669	21,326	3	21
21	Gujránwála	20,335	20,407	19,368	19,888	3	19
22	Shahpur*	3,835	2,613	3,026	2,820	0	10
23	Jhelum	2,059	2,059	3,593	2,826	0	17
24	Ráwalpindi	54,429	48,929	50,288	49,609	4	20
25	Hazára	208,469	209,786	177,389	193,588	47	24
26	Pesháwar	95,202	91,288	90,940	91,114	10	5
27	Kohát	19,097	21,785	16,854	19,320	8	10
28	Bannu	35,009	35,418	27,467	31,443	4	7
29	Dera Ismail Khan *	53	53	28	41	0	5
30	Dera Gházi Khan *	5	5	11	8	0	5
31	Muzaffargarh	20	22	7	15	0	4
	Total	1,234,866	1,248,260	1,182,152	1,215,206	5	...

N.B.—In districts marked * the areas are given according to the Provincial returns in col. 2,
In col. 6—0 signifies that the percentage is less than 1.
For the Kángra district the rainfall has been entered for Kángra, not for Dharmsála.

C.—DESCRIPTIVE LIST
OF
SAMPLES OF MAIZE GROWN IN THE PUNJAB.

1	2	3	4									5	6
			ROUGH ESTIMATE OF AREA ANNUALLY SOWN BY EACH KIND.										
			IRRIGATED.			UNIRRIGATED.							
							Dependent on rain.						
DISTRICT.	Number of samples.	LOCAL NAME.	Manured.	Unmanured.	Total irrigated.	Moist flooded lands.	Manured.	Unmanured.	Total.	Total unirrigated.	Grand Total.	Color of grain; white, yellow or red.	Description of soil on which each variety is usually sown and for which it is most suited.
			Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.		
HISSAR.	1	Makkai	83	...	83	...	...	...	...	...	83	White ...	**Hissar.** Both Dakar and Rausli.
	2	Ditto	25	18	43	...	...	...	...	..	43	Yellow ...	**Hansi.** Rausli ... ...
		Total ...	108	18	126	...	...	...	...	...	126		
ROHTAK.		Makkai	27	...	27	...	130	...	130	130	157		
GURGAON.	1	Makka	63	...	63	1,631	476	107	583	2,214	2,277	Yellow ...	Narmat Magda ...
	2	American maize	Poles. 10	...	Poles. 10	...	...	...	...	...	Poles. 10	White ...	Magda ... ...
		Total ...	Acres. 63	...	Acres. 63	1,631	476	107	583	2,214	Acres. 2,277		
DELHI.	1	Desi makkai ...	9,848	1,442	11,290	6,558	2,172	1,990	416	10,720	22,010	Light yellow	Rausli ... ...
KARNAL.	1	Makki pīli ...	1,625	205	1,830	531	1,597	703	2,300	2,831	4,661	Yellow ...	Rausli, cháhi, nahri and báráni
	2	Do. sufaid ...	1,562	156	1,718	330	1,106	406	1,512	1,842	3,560	White ...	Ditto ...
		Total ...	3,187	361	3,548	861	2,703	1,109	3,812	4,673	8,221		

7	8	9			10	11	12	13	14
Whether requiring careful cultivation and irrigation, or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	ESTIMATED YIELD OF GRAIN PER ACRE STATED IN SEERS OF 80 TOLAS.			Ordinary price, seers per rupee.	Are the stalks fed to cattle?	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Maximum.	Minimum.	Average.					
Requires much irrigation.	Mixed with no other crop.	400	240	320	20 seers per rupee.	Stalks are fed to cattle while green.	Nil.	Nil.	The grain can be kept only for 2 years.
Do. ...	Do. ...	480	320	400	25 seers per rupee.	Do. ...	Do. ...	Do. ...	Do.
Requiring careful cultivation and irrigation.	Generally sown separately, and in some places mixed with kangni and barti. In Khádar lands mixed with úrd.	800	80	440	From 25 to 35 seers per rupee.	Stalks are fed to cattle when there is scarcity of fodder.	Green cobs are roasted on coals or parched in an oven (Bhár) for consumption. In Palwal and Firozepur tahsíls the corn is ground into flour and cakes baked and eaten. Also gruel is made of it. In other tahsíls where the yield is small the corn is merely parched in an oven (Bhár) and eaten.	None ...	2 years.
Do. ...	Sown separately	640	240	440	25 seers per rupee.	Yes ...	...	Do. ...	1 year.
Requires careful cultivation and irrigation.	Generally sown alone, though it is sometimes mixed with kangni and úrd.	640	240	440	30	Yes, and also as fuel when they are too old and dry for cattle.	It is not a daily article of food, but the grain is largely consumed by man, it being eaten either boiled or roasted, or ground into flour and made into cakes. Beasts are not fed with it, it being too expensive for that purpose.	The produce is all consumed locally.	Will not keep beyond 12 months, except with great care.
Requires careful cultivation and irrigation.	Usually sown unmixed with any other grain, if ever sown mixed it is mixed with másh (úrd).	400	200	300	32 seers	Yes ...	Grain solely used for daily food of man.	Not exported.	The grain can keep for six months. Grain for seed is kept in cobs with leaves.
...	...	320	160	240					

1	2	3	4									5	6
			Rough estimate of area annually sown by each kind.										
			Irrigated.			Unirrigated.							
							Dependent on rain.						
District.	Number of samples.	Local Name.	Manured.	Unmanured.	Total irrigated.	Moist flooded lands.	Manured.	Unmanured.	Total.	Total unirrigated.	Grand Total.	Color of grain: white, yellow or red.	Description of soil on which each variety is usually sown and for which it is most suited.
			Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Indri	and Tahsil
Karnal—*concluded*.	1	Píli	3,100	750	3,850	1,000	1,500	3,550	5,050	6,050	9,900	Yellow ...	In the Nardak chiefly on Gora wells near the village site, in the Bangar chiefly on Gora wells or in unirrigated land, in Khadar on cháhi, sailáb and báráni lands.
	2	Dhauli	600	...	600	100	100	300	400	500	1,100	White ...	Chiefly cultivated in Khádir as it requires more moisture than píli.
		Total ...	3,700	750	4,450	1,100	1,600	3,850	5,450	6,550	11,000		
		District Total ...	6,887	1,111	7,998	1,961	4,303	4,959	9,262	11,223	19,221		
Umballa.	1	Maize (Pila ... / Dhaula)	1,394	1,394	2,787	870	38,398	38,397	76,795	77,665	80,452	White and yellow.	Good soil ...
													Jagadhri and
	2	Píli	3,250	750	4,000	3,250	4,500	24,500	29,000	32,250	36,250	Yellow ...	In Jagádhri makki is grown almost entirely as an unirrigated crop, but in Pípli a good deal is grown on irrigated land and especially on the Gora wells.
	3	Dhauli	1,500	250	1,750	2,000	250	1,750	2,000	4,000	5,750	Wh ...	Chiefly cultivated in Khadir, as it requires more moisture than píli.
		Total ...	4,750	1,000	5,750	5,250	4,750	26,250	31,000	36,750	42,000		
		District Total ...	6,144	2,393	8,537	6,120	43,148	64,647	107,795	113,915	122,452		
Simla.	1	White (Sarmoree)	...	...	...	...	...	321	321	321	321	White ...	Grown on all classes of soil except Chahgar.
	2	Chambar ...	...	...	...	...	210	950	1,160	1,160	1,160	Reddish yellow.	
	3	American ...	...	...	...	...	Poles. 16	...	Poles. 16	Poles. 16	Poles. 16	Mixed yellow and brown.	
		Total ...	...	...	...	...	Acres. 210	1,271	Acres. 1,481	Acres. 1,481	Acres. 1,481		
		Division Total ...	23,077	4,964	28,041	16,270	50,439	72,974	123,413	139,683	167,724		
													Kangra.
Kangra.	1	Combi	3,100	...	3,100	...	1,000	...	1,000	1,000	4,100	White ...	Is sown on the soil of every description, *viz.*, irrigated and unirrigated.
	2	Bhutú	4,109	...	4,109	...	10,200	...	10,200	10,200	14,309	Yellow ...	
		Do.	15	...	15	...	...	...	...	...	15	Red.	
		Total ...	7,224	...	7,224	...	11,200	...	11,200	11,200	18,424		
													Dehra.
	1	Maize	4,280	200	4,480	...	27,860	3,110	30,970	30,970	35,450	Yellow ...	Is sown on the soil of every description, *viz.*, irrigated, or unirrigated excepting Nád land where water always stands.
	2	Maize Gadi ...	25	...	25	...	...	...	...	...	25	White ...	
		Total ...	4,305	200	4,505	...	27,860	3,110	30,970	30,970	35,475		

7	8	9			10	11	12	13	14
Whether requiring careful cultivation and irrigation, or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	ESTIMATED YIELD OF GRAIN PER ACRE STATED IN SEERS OF 80 TOLAS.			Ordinary price, seers per rupee.	Are the stalks fed to cattle?	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Maximum.	Minimum.	Average.					
Kaithal.									
The irrigated makkí is cultivated with extreme care and the land heavily manured before sowing. It is weeded 3 or 4 times. The báráni cultivation is much less careful.	In cháhi lands usually sown alone, in báráni lands generally sown mixed with úrd or úrdi. A little til is often added.	Cháhi. 800 Sailába. 480 Báráni. 360	Cháhi. 400 Sailába. 240 Báráni. 160	Cháhi. 560 Sailába. 360 Báráni 240	35 seers	Stalks only used as fodder in years of scarcity.	Food for men...	Nil. ...	Five or six months. Flour made of grain which has been kept longer is considered inferior.
Dhauli requires even more care than píli as it is less hardy and requires more watering.	...	Do.	Do.	Do.	33 seers	Do. ...	Do. ...	Nil. ...	Do. ...
Careful cultivation.	Frequently mixed with mará and úrd, surrounded with til.	808	67	494	...	Yes	A staple winter food for men.	None to speak of.	A year.
Pípli.									
The irrigated makki is cultivated with extreme care and the land is heavily manured before sowing. It is weeded 3 or 4 times. The báráni cultivation is much less careful.	In cháhi lands usually sown alone, in báráni lands generally sown mixed with úrd or úrdi. A little til is often added.	Cháhi. 800 Sailába. 480 Báráni. 360	Cháhi. 400 Sailába. 240 Báráni. 160	Cháhi. 560 Sailába. 360 Báráni. 240	35 seers.	Stalks only used as fodder in year of scarcity.	Food for men...	There is no export from Pipli. There is some export from Jagádhri towards Ludhiána and Amritsar.	Five or six months. Flour made of grain which has been kept longer is considered inferior.
Dhauli requires even more care than píli as it is less hardy and requires more watering.	...	Do.	Do.	Do.	33 seers.	Do. ...	Do. ...	Nil. ...	Do.
Never irrigated artificially, the better the cultivation the better the crop. But usually the crop is treated with but little care.	Not usually mixed with any other crop.	300 280	80 80	190 180	34 34	} Yes ...	Only used as food for human beings. [Produce so far has been experimental.]	Crops locally consumed.	Only keeps for one year.
Requires careful cultivation and irrigation.	Is mixed with other crops such as másh rong an kulth	480 400	120 80	300 240	40 ...	Yes	Used chiefly as food for men. ...	... ...	1 year. ...
Is treated with little care.	Is mixed with másh, til, kangni, seal and rong.	264	72	168	30 seers.	Yes ...	Used chiefly as food for men.	...	

2	3	4									5	6
		ROUGH ESTIMATE OF AREA ANNUALLY SOWN BY EACH KIND.										
		IRRIGATED.			UNIRRIGATED.							
						Dependent on rain.						
Number of samples.	LOCAL NAME.	Manured.	Unmanured.	Total irrigated.	Moist flooded lands.	Manured.	Unmanured.	Total.	Total unirrigated.	Grand Total.	Color of grain: white, yellow or red.	Description of soil on which each variety is usually sown, and for which it is most suited.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.		
	Maize	2,746	...	2,746	...	5,222	...	5,222	5,222	7,968	Red or yellow	**Palampur.** Is sown on soil of every description, *viz.*, irrigated or unirrigated, excepting Nád land, where water always stands.
	Do.	200	..	200	...	8,200	...	8,200	8,200	8,400	Do. ...	**Nurpur.** Is sown on unirrigated soil.
	Maize, Rohra or Gadi.	...	...	...	...	7,250	33,250	40,500	40,500	40,500	Yellow ...	**Hamirpur.** Is sown on unirrigated soil.
	Rohra	...	...	...	...	1,068	...	1,068	1,068	1,068	Red ...	**Plach.** Is sown on unirrigated soil.
	Tandar maize ...	...	...	...	...	5,370	...	5,370	5,370	5,370	Yellow ...	**Kulu.** Is sown on unirrigated soil.
	Sibtú English maize.	...	...	...	...	1	...	1	1	1	White ...	...
	Total ...	...	...	...	...	5,371	...	...	...	5,371		
	District Total ...	14,475	200	14,675	...	66,171	36,360	102,531	102,531	117,206		
1	Chan or Kuthi ...	9,962	396	10,358	...	51,306	63,052	114,358	114,358	124,716	Yellow ...	Cháhi, niái, chhal and maira.
2	Dhusar	26	50	76	...	1,210	2,050	3,260	3,260	3,336	Light yellow	Chhal.
3	Sufaid	10	3	13	...	79	128	207	207	220	White ...	Cháhi, maira, niái and chhal.
	Total ...	9,998	449	10,447	...	52,595	65,230	117,825	117,825	128,272		
(b) average.	Láll	18,000	...	1,800	800	200	...	200	1,000	19,000	Orange yellow	**Nawashahr.** Highly manured and irrigated.
	Láll or káthi ...	17,000	..	17,000	400	400	..	400	800	17,800	Orange yellow	**Phillour.** Highly manured and irrigated.
	Dhusri	100	...	100	...	...	...	...	...	100	Light yellow with whitish grains in places.	...
		17,100	...	17,100	400	400	...	400	800	17,900		

OF MAIZE GROWN IN THE PUNJAB—*continued.*

7	8	9			10	11	12	13	14
Whether requiring careful cultivation and irrigation, or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	Estimated yield of grain per acre stated in seers of 80 Totas.			Ordinary price, seers per rupee.	Are the stalks fed to cattle?	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Maximum.	Minimum.	Average.					
Requires careful cultivation and irrigation.	Is mixed with másh, kulthi, rong and kakra.	160	90	125	32 seers.	...	...	...	6 months.
Do. ...	Do. ...	800	240	520	44 seers.	...	...	...	1 year.
Do. ...	Is not mixed with any crop.	880	40	460	32 seers.	...	...	...	...
Do. ...	Is mixed with rong crop.	1,020	510	765	32 seers.	...	...	...	...
Do. ...	Is not mixed with any other crop.	600	320	460	40	...	...	...	...
...	...	520	280	400	...	...	...	...	Is sown by Mr. Theodore for his own use.
Careful cultivation necessary. Great care is generally taken, most of the maize is grown on unirrigated land.	Usually sown alone, sometimes mixed with másh, múng, mandal or kangni.	800	120	440	40	Yes ...	Nearly the whole consumed in this district.	No exports worth mentioning.	For a year.
Requires careful cultivation and irrrigation.	Not in irrigated land. In moist river land másh is sometimes mixed with maize and in dry land moth or múng, but rarely.	880	200	740	36	Yes ...	Used as cold weather food of people for which purpose it is usually ground, and the meal made into cakes. It is also used parched and is rarely made into porridge, occasionally it is given as meal or porridge to cattle in milk.	Not exported.	A year.
Requires careful cultivation and irrigation.	Not in irrigated land. In moist river land másh is sometimes mixed with maize and in dry land moth and múng, but rarely.	760 600	200 ...	700 600	36	Do. ...	Do. ...	Do. ...	Do. ...

1	2	3	4									5	6
			ROUGH ESTIMATE OF AREA ANNUALLY SOWN BY EACH KIND.										
			IRRIGATED.			UNIRRIGATED.							
							Dependent on Rain.						
DISTRICT.	Number of samples.	LOCAL NAME.	Manured.	Unmanured.	Total irrigated.	Moist flooded land.	Manured.	Unmanured.	Total.	Total unirrigated.	Grand Total.	Color of grain: white, yellow or red.	Description of soil on which each variety is usually sown and for which it is most suited.
			Acres.	Acres.	Acres.	Acres	Acres.	Acres.	Acres.	Acres.	Acres.		
JULLUNDUR—*concluded*.		Makki	20,000	...	20,000	1,300	500	...	...	...	21,800	Orange yellow	**Nakodar.** Highly manured and irrigated.
		Dhamakki (very rare, no information concerning area, &c., available. This seems to be the kind called Lahori, and to differ from the Desi (Dhamakka of Jullundur) in color.	...	...	...	...	...	...	...	...	...	White.	
		Dagh or Dhusra	800	...	800	...	500	...	500	500	1,300	Light yellow with whitish grains in place.	**Jullundur.** Highly manured and irrigated.
		Chhán	15,000	...	15,000	...	10,000	...	10,000	10,000	25,000	Orange yellow	
		Dhamakka (Jullundur).	300	...	300	...	200	...	200	200	500	Do. ...	
		Total ...	16,100	...	16,100	...	10,700	...	10,700	10,700	26,800		
		District Total...	71,200	...	71,200	2,500	11,800	...	11,800	14,300	85,500		
LUDHIANA.	1	Yellow	43,285	599	43,884	6,261	565	3,792	4,357	10,618	54,502	Yellow ...	Dokar (hard soil) is best suited. Is sown throughout the district.
	2	White	...	...	...	...	...	...	...	...	...	...	...
	3	Red	...	...	...	...	...	...	...	...	...	...	...
		Total ...	43,285	599	43,884	6,261	565	3,792	4,357	10,618	54,502		
FEROZEPORE.		Makki	25,079	...	25,079	...	659	...	659	659	25,738		
		Division Total ...	149,562	1,048	150,610	8,761	65,619	69,022	134,641	143,402	294,012		
MOOLTAN.		Makki	256	...	256	...	...	...	...	...	256		
JHANG.	1	Desi or indigenous.	...	...	...	...	...	...	...	...	...	White ...	Hard soil.
	2	Khushabi ...	6,052	...	6,052	...	...	...	...	...	6,052	Do. ...	
	3	Pahári or hilly ...	...	...	...	...	...	...	...	...	...	Yellow ...	
		Total ...	6,052	...	6,052	...	...	...	...	...	6,052		
MONTGOMERY.		Makki	1,979	...	1,979	...	78	...	...	...	2,057		
LAHORE.		Makki	36,781	...	36,781	...	51	...	51	51	36,832		

7	8	9			10	11	12	13	14
Whether requiring careful cultivation and irrigation, or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	Estimated yield of grain per acre stated in seers of 80 Tolas.			Ordinary price, seers per rupee.	Are the stalks fed to cattle?	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Maximum.	Minimum.	Average.					
Requires careful cultivation and irrigation.	Not in irrigated land. In moist river land másh is sometimes mixed with maize and in dry land moth and múng but rarely.	760	200	680	...	Yes ...	Used as cold weather food of people for which purpose it usually ground, and the meal made into cakes. It is also used parched and is rarely made into porridge, occasionally it is given as meal or porridge to cattle in milk.	Mds. 25,000 to Kángra and Hoshiárpur.	A year.
Do. ...	Do. ...	680	200	640	Do. ...	Do. ...	Do. ...	Mds. 20,000 to Kángra and Hoshiárpur.	Do.
Requires careful cultivation and irrigation and also sufficient manuring.	Sometimes mixed with ajwán, methi, carrots and aniseed sown after the crop has grown to a height.	711	485	604	40 seers.	Yes ...	Extremely used by the rural or poorer classes for food; grain never used for cattle.	About ¼ of the produce is exported to Jullundur, Umballa and Hoshiárpur.	Not more than a year.
...	...	...	...	...	...	...	...	...	These are never sown as distinct crop in this district.
...	...	...	...	...	...	...	...	...	
Careful cultivation and irrigation.	Mixed with no other crop.	768	384	576	27 seers	Yes ...	It is very much used for daily food of man at Chiniot in the cold weather. It is also fed to the cattle.	Not exported...	Six months if the grain is separated from the cobs, if not throughout the year.

	3	4									5	6
		Rough estimate of area annually sown by each kind.										
		Irrigated.			Unirrigated.							
						Dependent on rain.						
	Local name.	Manured.	Unmanured.	Total irrigated.	Moist flooded lands.	Manured.	Unmanured.	Total.	Total unirrigated.	Grand Total.	Color of grain: white, yellow or red.	Description of soil on which each variety is usually sown and for which it is most suited.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.		
1	Makki or bari jowár.	6,150	...	6,150	...	...	...	...	...	6,150	Yellow ...	Gora soil preferred
2	Makki or choti jowár.	24,515	...	24,515	...	...	...	...	...	24,515	Do. ...	Do. ...
3	Makki	6,125	...	6,125	6,125	...	...	...	...	12,250	White ...	Sailába or cháhi...
	Ditto Lahori ...	6,553	...	6,553	...	...	...	...	...	6,553	Do. ...	Do. ...
	Total ...	43,343	...	43,343	6,125	...	...	...	...	49,468		
												Gurdaspur.
	Makki and jowár	1,605	715	2,320	...	1,235	330	1,565	1,565	3,885	Yellow ...	Gora, rohi dosháhi and maira.
	Do. ...	3,235	1,215	4,450	...	2,995	985	3,980	3,980	8,430	White ...	Do. ...
	Total ...	4,840	1,930	6,770	...	4,230	1,315	5,545	5,545	12,315		
												Batala.
	Makki and jowár	5,300	1,200	6,500	800	400	...	400	1,200	7,700	Yellow ...	Dosháhi.
	Do. ...	1,500	300	1,800	200	400	100	500	700	2,500	White ...	Do. ...
	Total ...	6,800	1,500	8,300	1,000	800	100	900	1,900	10,200		
												Shakargarh.
	Makki and jowár	760	...	760	1,750	3,000	400	3,400	5,150	5,910	Yellow ...	Rohi and dosháhi, maira and sailába.
	Do. ...	730	...	730	1,100	6,370	720	7,090	8,190	8,920	White ...	Do. ...
	Total ...	1,490	...	1,490	2,850	9,370	1,120	10,490	13,340	14,830		
												Pathankot.
	Makki and jowár	...	...	...	452	1,200	...	1,200	1,652	1,652	Yellow ...	Báráni and sailába.
	Do. ...	...	...	...	750	3,340	450	3,790	4,540	4,540	White ...	Do. ...
	Total ...	...	...	...	1,202	4,540	450	4,990	6,192	6,192		
	Yellow	7,665	1,915	9,580	3,002	5,885	730	6,565	9,567	19,147		
	White	5,465	1,515	6,980	2,050	13,105	2,255	15,360	17,410	24,390		
	Total ...	13,130	3,430	16,560	5,052	18,940	2,985	21,925	26,977	43,537		
	Division Total ...	101,541	3,430	104,971	11,177	19,069	2,985	22,054	33,231	138,202		
	White ...	31,157	4,197	35,354	6,467	8,075	4,271	12,346	18,813	54,167	White ...	Maira, dosháhi and garah.
	Yellow	4,719	452	5,171	4,043	2,227	300	2,527	6,570	11,741	Yellow ...	Do. ...
	Total ...	35,876	4,649	40,525	10,510	10,302	4,571	14,873	25,383	65,908		
	Sufaid	3,834	2,079	5,913	4,396	362	1,447	1,809	6,205	12,118	White ...	Dosahi soft without mixture of sand.
	Zard	863	...	863	290	30	...	30	320	1,183	Yellow ...	Do. ...
	Total ...	4,697	2,079	6,776	4,686	392	1,447	1,839	6,525	13,301		

7	8	9			10	11	12	13	14
Whether requiring careful cultivation and irrigation or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	ESTIMATED YIELD OF GRAIN PER ACRE STATED IN SEERS OF 80 TOLAS.			Ordinary price, seers per rupee.	Are the stalks fed to cattle?	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Maximum.	Minimum.	Average.					
Careful cultivation and irrigation necessary.	Usually sown singly sometimes used with másh and til.	960	760	850	32 seers per rupee.	The upper portion used for cattle and the lower used as fuel.	1 seer for man and 2 to 4 seers for buffalo.	Not exported but consumed in the district.	One year after which it is usually devoured by insects.
		760	400	520	Do. ...	Used as fodder for cattle.	Do. ...	Do. ...	
Careful cultivation and manuring necessary.	Do. ...	680	400	520	33 seers ...	The upper portion used for cattle and the below used a fuel.	Do. ...	Do. ...	
After it has germinated, much attention is not required.	Do. ...	1,324	120	130	Do. ...	Do. ...	Do. ...	Do. ...	
Requires careful cultivation. If there be timely rainfall it would not require irrigation, otherwise the field should be irrigated once before sowing and three times after the seed has been sown.	Usually mixed with másh.	480	200	320	50	If no other kind of fodder is procurable it is used by cattle. It is generally burnt in boiling surgarcane juice.	Generally used by the zamíndárs and the poor classes of people. It is not given to cattle.	Not exported.	For one year.
	Do. ...	320	120	240	50			Do. ...	Do.
Do. ...	Usually mixed with másh and kangni.	720	400	560	40	Do. ...	Do. ...	Do. ...	Do.
	Do. ...	560	320	400	40			Do. ...	Do.
Do. ...	Do. ...	1,160	200	560	52	Do. ...	Do. ...	Exported to Amritsar and Siálkot about ¼ of the produce.	Do.
	Do. ...	960	240	640	52				Do.
	Do. ...	320	120	240	40			Not exported.	Do. } For 3 or 4 years where snow falls.
	Do. ...	480	160	320	40			Do. ...	Do. }
Requires attention and careful cultivation and irrigation.	Másh, múng, síl, massar, kangni and rawán.	800	240	480	40	Yes ...	About nine-tenths by men and one-tenth by beasts.	Nothing exported.	Six months.
Do. ...		640	480	480	44	Do. ...		Do.	Do.
Requires careful cultivation and irrigation.	Not mixed with any other crop.	640	240	440	44	Yes ...	One-eighth of the produce is used for food of cattle, seven-eighths for food of men.	Not exported to other districts.	For one year if kept carefully.
Do. ...	Do. ...	600	240	420	42	Do. ...			

District.	Number of samples.	Local name.	Rough estimate of area annually sown by each kind. — Irrigated. — Manured.	Irrigated. — Unmanured.	Irrigated. — Total irrigated.	Unirrigated. — Moist flooded lands.	Unirrigated. — Dependent on rain. — Manured.	Dependent on rain. — Unmanured.	Dependent on rain. — Total.	Total unirrigated.	Grand Total.	Color of grain: white, yellow or red.	Description of soil on which each variety is usually sown and for which it is most suited.
1	2	3	4									5	6
			Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.		
GUJRANWALA.	1	Makkai ...	9,131	...	9,131	...	...	...	...	...	9,131	White and yellow.	**Gujranwala.** 1 Rohi, cháhi. 2 Dosahi, Do. 3 Maira, Do.
	2	Do. ...	2,350	...	2,350	1,140	...	...	...	1,140	3,490	White ...	**Hafizabad.** 1 Rohi, cháhi. 2 Dosahi, Do. 3 Sailába.
	3	Do. ...	5,310	900	6,210	1,504	...	...	...	1,504	7,714	Yellow ...	**Wazirabad.** Dosahi, cháhi and sailábi.
		Total ...	16,791	900	17,691	2,644	...	...	...	2,644	20,335		
SHAHPUR.	1	Watni (white) ...	725	500	1,225	600	...	...	...	600	1,825	White ...	Generally sown in the strip of land locally called kadhi, and lying on the banks of the river.
	2	Watni (yellow) ...	960	150	1,110	250	200	300	500	750	1,860	Yellow ...	Sown in every sort of soil where maize can be grown being the variety of maize most common in the country.
	3	Watni (ratti) ...	150	...	150	...	...	...	...	...	150	Red ...	Very little is grown on some of the wells.
		Total ...	1,835	650	2,485	850	200	300	500	1,350	3,835		
JHELUM.	10	Walaitee makki...	1/8	...	1/8	...	...	...	...	...	1/8	White ...	Hail or some other strong land.
RAWALPINDI.	1	Chitti ...	1,325	530	1,855	...	4,940	2,990	7,930	7,930	9,785	White ...	**Rawalpindi** Cháhi, nahri and lipara.
	2	Pîli makki ...	372	250	622	...	1,045	631	1,676	1,676	2,298	Yellow ...	Cháhi, nahri and lipara.
	3	Kari ...	28	20	48	...	155	21	176	176	224	Purple ...	Cháhi, nahri and lipara.
		Total ...	1,725	800	2,525	...	6,140	3,642	9,782	9,782	12,307		
	1	Chitti ...	8,770	...	8,770	...	...	...	...	...	8,770	White ...	**Attock.** Cháhi, nahri and lipara.
	2	Pîli ...	...	...	...	...	3,667	...	3,667	3,667	3,667	Yellow ...	Cháhi, nahri and lipara.
	3	Garma, or (American maize.	24	...	24	...	...	...	...	...	24	Light-yellow	Cháhi, nahri and lipara.
		Total ...	8,794	...	8,794	...	3,667	...	3,667	3,667	12,461		

OF MAIZE GROWN IN THE PUNJAB—*continued.*

7	8	9			10	11	12	13	14
Whether requiring careful cultivation and irrigation, or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	ESTIMATED YIELD OF GRAIN PER ACRE STATED IN SEERS OF 80 TOLAS.			Ordinary price, seers per rupee.	Are the stalks fed to cattle?	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Maximum.	Minimum.	Average.					
Requires a careful cultivation.	Is not mixed with any other crop.	640	160	400	36	Stalks are used for cattle.	Four-fifths of the produce is consumed by men one-fifth by cattle.	Nil ...	The grain lasts for one year.
Requires a careful cultivation. Also requires a careful cultivation but is not irrigated.	Is not mixed with any crops, but sometimes másh crop is mixed with it in the sailábi land.	320	160	240	32	Do. ...	Five-sixths by men and one-sixth by cattle.	Do. ...	Do.
Do. ...	Do. ...	560	160	360	46	Do. ...	Three-fourths by men one-fourth by cattle.	Do. ...	Do.
Maize cultivation requires care and protection but there is no one particular variety grown in this district requiring more care than the common maize crops.	Not usually mixed but only occasionally with kangni and some other crops as stated in the report.	...	...	...	...	Yes : stalks are fed to cattle.	In the hills the grain is used as the principal food for men in the winter months, and in plains it is consumed either in roasted cobs or as parched grain and occasionally is made into bread.	No export ...	For about two years.
Do. ...	Do. ...	640	80	360	40	Do. ...	Do. ...	Do. ...	
Usual care required.	Not ...	720	160	440	Never sold but probably dearer than common maize.	Yes ...	...	...	Probably for six months.
With an opportune rain-fall lipara is as good as irrigated land. The white variety (chitti) and the American maize require the most careful cultivation.	Mothi for cattle is occasionally mixed with the crop in Pindi Gheb in proportion of 1 to 4 and dhaníán, a masála, is mixed in the Murree tahsíl ; as a rule the crop is not mixed.	1,280	240	760	43	Invariably whatever the description of makki (maize) grown.	The grain is used for making flour all through the district. In the hills the people eat nothing else ; in the plains. bread made of maize flour is eaten in winter.	There is no export of Indian corn from the district. The hill tribes of Murree and Kahuta import maize from Poonch and retail in the southern tahsíls.	The grain will keep about a year in hot climate and for two years in the hills.
		1,280	240	760	46				
		1,280	240	760	46				
		1,843	820	1,332	44				
Píli (yellow) is very hardy.		962	520	741	44				
		960	480	720	44				

1	2	3	4									5	6
			Rough estimate of area annually sown by each kind.										
			Irrigated.			Unirrigated.							
							Dependent on rain.						
District.	Number of samples.	Local name.	Manured.	Unmanured.	Total irrigated.	Moist flooded lands.	Manured.	Unmanured.	Total.	Total unirrigated.	Grand Total.	Color of grain; white, yellow or red.	Description of soil on which each variety is usually sown, and for which it is most suited.
			Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.		**Kahuta.**
RAWALPINDI—*concluded.*	1	Chitti makki ...	28	35	63	...	7,425	467	7,892	7,892	7,955	White ...	Cháhi, nahri and lipara.
	2	Píli makki ...	4	5	9	...	203	92	295	295	304	Yellow ...	
		Total ...	32	40	72	...	7,628	559	8,187	8,187	8,259		
													Murree.
	1	Tri mahín ...	...	...	...	...	3,811	1,715	5,526	5,526	5,526	White ...	Cháhi, nahri and lipara.
	2	Sathri ...	...	...	...	...	2,210	418	2,628	2,628	2,628	Do. ...	
	3	Saithi ...	...	...	...	...	3,012	1,122	4,134	4,134	4,134	Light-yellow	Any soil.
	4	Kári ...	...	...	...	...	548	383	931	931	931	Dove-colored	Cháhi, nahri and lipári.
	5	Píli ...	...	...	...	...	453	255	708	708	708	Yellow ...	
		Total ...	...	...	...	...	10,034	3,893	13,927	13,927	13,927		
													Pindi Gheb.
	1	Chitti makki ...	281	...	281	...	...	...	...	...	281	White ...	Chahi and nahri.
	2	Píli makki ...	550	...	550	...	...	...	...	...	550	Yellow ...	Do. ...
		Total ...	831	...	831	...	...	...	...	...	831		
													Fatteh Jang.
	1	Makki chitti ...	4,200	...	4,200	...	...	...	...	...	4,200	White ...	Cháhi.
	2	Do. píli ...	1,171	...	1,171	35	...	...	...	35	1,206	Yellow ...	Do. ...
		Total ...	5,371	...	5,371	35	...	...	...	35	5,406		
													Gujar Khan.
	1	Píli makki ...	280	...	280	...	689	...	689	689	969	Yellow ...	Chahi and lipara.
	2	Chitti Do. ...	95	...	95	...	174	...	174	174	269	White ...	Do. ...
		Total ...	375	...	375	...	863	...	863	863	1,238		*Note.*—I consider that the estimated yield is exaggerated. It certainly is so in the Murree tahsíl where the land is often of poor quality.
		District Total ...	17,128	840	17,968	35	28,332	8,094	36,426	36,461	54,429		
		Division Total ...	76,327	9,118	85,445	18,725	39,226	14,412	53,638	72,363	157,808		
HAZARA.	1	Watni makki ...	3,748	6,382	10,130	...	39,343	92,784	132,127	132,127	142,257	White ...	Bari-bela, kund, maiṛa rukker, khushki bágh, cháhi, bágh kitah, cháhi, abi, cháhi, khushki, báhirdi abi, naiágaír, khushki.
	2	Píli makki ...	1,413	3,384	4,797	...	21,200	35,261	56,461	56,461	61,258	Yellow ...	Do. ...
	3	Suhi makki ...	56	98	154	...	591	4,209	4,800	4,800	4,954	Red ...	Bári and khushki.
		Total ...	1,469	3,482	4,951	...	21,791	39,470	61,261	61,261	208,469		

OF MAIZE GROWN IN THE PUNJAB—*continued.*

7	8	9			10	11	12	13	14
Whether requiring careful cultivation and irrigation or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	ESTIMATED YIELD OF GRAIN PER ACRE STATED IN SEERS OF 80 TOLAS.			Ordinary price, seers per rupee.	Are the stalks fed to cattle?	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Maximum.	Minimum.	Average.					
With an opportune rainfall, lipara is as good as irrigated land. The white variety (chitti) and the American maize require the most careful cultivation.	Mothi for cattle is occasionally mixed with the crop in Pindigheb in proportion of 1 to 4, and dhaniân, a masala, is mixed in the Murree tahsîl as a rule, the crop is not mixed.	1,000	480	740	52	Invariably ...	The grain is used for making flour all through the districts. In the hills the people eat nothing else; in the plains bread made of maize flour is eaten in winter.	There is no export of Indian corn from the district. The hill tribes of Murree and Kahuta import maize from Poonch and retail in the southern tahsîls.	The grain will keep about a year in hot climate, and for two years in the hills.
	Do. ...	800	320	560	52	Do. ...	Do. ...	Do. ...	Do.
Saithi is very hardy. Pîli and kari are also hardy. With opportune rainfall irrigation is not necessary.	"Dhanian" a masala, is mixed sometimes in Murree tahsîl with the maize at sowing.	800	200	500	35	Invariably ...	In Murree tahsîl pîli is chiefly used to feed cattle.	Do.	Do.
		800	200	500	35	Do. ...		Do. ...	Do.
		640	160	400	35	Do. ...			
		720	200	460	35	Do. ...			
		480	120	300	35	Do. ...			
With an opportune rainfall lipara is as good as irrigated land. The white variety (chitti) and the American maize require the most careful cultivation.	Mothi for cattle is occasionally mixed with the crop in Pindi Gheb in proportion of 1 to 4 and dhaniân a masála is mixed in the Murree tahsîl; as a rule, the crop is not mixed.	1,200	480	840	50	Invariably whatever the description of makki (maize) grown.	The grain is used for making flour all through the district. In the hills the people eat nothing else; in the plains bread made of maize flour is eaten in winter.	Do. ...	Do.
		1,200	480	840	50			Do. ...	Do.
Do. ...	Do. ...	1,900	800	1,350	60	Do. ...	Do. ...	Do. ...	Do.
Do. ...	Do. ...	1,900	800	1,350	60	Do. ...	Do. ...	Do. ...	Do.
Do. ...	Do. ...	960	200	580	40	Do. ...	Do. ...	Do. ...	Do.
Do. ...	Do. ...	880	150	515	40	Do. ...	Do. ...	Do. ...	Do.
Careful cultivation.	Másh, moth múng and haldi or turmeric.	960	680	840	48 seers per rupee.	Stalks used for cattle feeding.	Three-fourths used within the district as food for man.	One-fourth of the whole exported to Rawalpindi and Peshâwar districts.	For sowing one year for eating 3 years.
Do. ...	Do. ...	990	680	840	Do. ...	Do. ...	...	Do. ...	Do.
Do. ...	Mash and moth	960	640	800	Do. ...	Do. ...	...	Do. ...	Do.

1	2	3	4									5	6
			ROUGH ESTIMATE OF AREA ANNUALLY SOWN BY EACH KIND.										
			Irrigated.			Unirrigated.							
							Dependent on rain.						
District.	Number of samples.	Local name.	Manured.	Unmanured.	Total irrigated.	Moist flooded lands.	Manured.	Unmanured.	Total.	Total unirrigated.	Grand Total.	Color of grain : white, yellow or red.	Description of soil on which each variety is usually sown and for which it is most suited.
PESHAWAR.	20	Jowár including two or three minor varieties, *viz.*, white, yellow and red.	Acres. 63,553	Acres. 20,560	Acres. 84,113	Acres. 9,163	Acres. 86	Acres. 1,840	Acres. 1,926	Acres. 11,089	Acres. 95,202	White, yellow and red. Very little of the last two varieties cultivated. These are only cultivated in báráni lands, such as the Hastnagar maira. The red is hardly a distinctive variety, and is only found in Peshávar tahsíl.	Mat ... ...
KOHAT.	1	Sarda ...	8,485	525	9,010	...	540	5,694	6,234	6,234	15,244	White ...	Irrigated and unirrigated.
	2	Garma ...	3,618	125	3,743	...	...	110	110	110	3,853	Yellow ...	Ditto ...
		Total ...	12,103	650	12,753	...	540	5,804	6,344	6,344	19,097		
		Division total ...	77,125	24,692	101,817	9,163	22,417	47,114	69,531	78,694	180,511		
BANNU.	1	Jowár ...	14,445	10,181	24,626	...	...	...	...	...	24,626	White ...	Soft irrigated manured land.
	2	Do. ...	6,940	3,443	10,383	...	...	...	...	...	10,383	Yellow ...	Ditto ...
		Total ...	21,385	13,624	35,009	...	...	...	...	...	35,009		
DERA ISMAIL KHAN.		Makki ...	53	...	53	...	...	...	...	...	53		
DERA GHAZI KHAN.		Makki ...	5	...	5	...	...	...	...	...	5		
MUZAFFARGARH.	1	Makki ...	A. P. 20 19	...	A. P. 20 19	...	...	...	...	...	A. P. 20 19	White ...	Gass ... ...
		Division Total ...	Acres. 21,463	13,623	Acres. 35,087	...	...	...	...	...	Acres. 35,087		
		Punjab Total ...	449,095	56,876	505,971	64,096	196,770	206,507	403,277	467,373	973,344		

OF MAIZE GROWN IN THE PUNJAB—*concluded.*

7	8	9			10	11	12	13	14
Whether requiring careful cultivation and irrigation, or treated with little care.	Whether usually mixed with other crops, and if so, with what crops.	ESTIMATED YIELD OF GRAIN PER ACRE STATED IN SEERS OF 80 TOLAS.			Ordinary price, seers per rupee.	Are the stalks fed to cattle?	How far the grain is used for daily food of man or beast.	How much exported, and to what districts.	How long the grain will keep.
		Maximum.	Minimum.	Average.					
This crop requires more careful cultivation than wheat, though less than sugar-cane. The white variety requires greater care and more water than the other kinds.	Not generally. In rare cases mixed with mustard in báráni lands and radishes in ábí lands.	2,360	240	820	52, very, cheap, owing to excessive cheapness a good deal of maize has been thrown out of cultivation during the present year.	Yes; both in the green and dry state.	Bread made of maize flour forms during the winter months the common staple food amongst the lower classes. Unripe ears eaten roasted and sometimes also boiled, grains of the ripe cobs are also eaten roasted. Unripe cobs given generally to horses, sheep, &c., for fattening purposes.	A small quantity is exported to the adjacent trans-border hills, but none to any of the other districts of the Punjab.	Generally one year, with care for 2 years, after that gets bitter and loses its sweetness.
Requires care ...	Not mixed with any other crop.	1,371	135	753	58	Yes ...	The grain forms a staple food for mankind.	Not exported to any district, except a small quantity from the Hangu Tahsil to Tirah.	If kept in a well ventilated house it will keep from 2 to 3 years, otherwise it is infested with weevils in a year.
Requires less care than sarda.	Do. ...	1,160	120	640	64	Do. ...			
Requires careful cultivation and irrigation.	Not usually mixed with other crops.	720	210	465	58	Yes ...	1 seer per man daily and 2¼ seer per head of cattle.	Maunds 2,000 exported to Dawár and other independent territories.	One year.
Do. ...	Do. ...	720	210	465	58	Do. ...	Do. ...	800 maunds exported to Dawár and other independent territories.	Do.
Treated with little care.	Not mixed with other crops.	800	320	560	It is not sold in grain in this district; only stalks are sold 4 for 3 pies.	Yes they are given to bullocks.	Grain is not used for daily food of man or beast, but as an extra food during September.	Nil	...

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